JULY 1952

ARMY INFORMATION DIGEST

The Army and Public Service

Advancing Mutual Security

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Thunderbirds on Hokkaido

Postgraduate School of the Navy

What's New in Vapor Barrier Clothing

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The National War College

Armor Military Stakes

Red China's Fighting Hordes—Part VI

Naval Co-operation in the Mediterranean

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ARMY
INFORMATION
DIGEST

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In This Issue:

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PATHS TO SERVICE. As they graduate from institutions of higher learning across the land, thousands of young men this summer will trade cap and gown for more functional Army, Navy and Air Force attire. Far from being an interruption in one's career, military training opens up vistas of opportunity for those aspiring to a professional career in the public service. As the Secretary of the Army states in the lead article, "The Army offers a man, while still young, unsurpassed opportunities for experience in management and executive leadership that in the normal course of civilian life would come only after many years."

Within the services, a system of professional education runs the gamut from combat arm and technical branch training to the highest level unified schools. Two advanced schools—the National War College and the United States Naval Postgraduate School—are story subjects this month.

GLOBAL TRAINING. Although continents and oceans may separate them geographically, American infantrymen on Hokkaido; Armor students at Fort Knox; United States, British, French and Italian naval crews in the Mediterranean; and foreign technicians from nations receiving MDAP aid are linked together by common objectives. A sense of urgency animates their training. Readiness is their watchword; preparedness to defend the free world is their business. Training being given American and allied personnel is described in four articles.

MAPS IN THE MAKING. Paralleling the Nation's growth, Army map making activities have been expanded from part-time topographic work carried on by instructors at the United States Military Academy to today's highly specialized Army Map Service with its ultra-modern plant and facilities. The history of Army Map Service is traced in "The Development of Army Mapping."

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U. S. Army Photograph

Today young people find in government and military life an opportunity for service which is both vital to their country and satisfying to themselves.
The Honorable Frank Pace, Jr.

THE ARMY AND PUBLIC SERVICE

THE HONORABLE FRANK PACE, JR.

HOW can we continuously develop a large corps of experienced, dependable public servants? One of our major problems today is to interest men of high integrity who will be capable of carrying out the complex functions of modern government. It is a particularly acute problem when we realize how much more reliance Americans place in their public servants since this Nation assumed the leadership of the free world. It becomes even more apparent when we understand the nature of the exacting burden which our government must carry for years to come.

There are a number of misconceptions about government service. There is the fear that public service is a here-today-gone-tomorrow proposition. Many worry that a change of administration or a sudden alleviation of the critical international situation might cause wholesale dissolution of the governmental apparatus. Yet no matter how widely government operations are cut back, it is unreasonable to assume that government may suddenly return to the proportions of the Nineteenth Century.

Another misconception is that government offers fine careers for the incompetent. I suggest that it will be an eye-opening experience for those who still believe this to examine the caliber of the young men entering Federal, state and local governments today. Often, outstanding graduates of our colleges prefer government service to any other field of endeavor.

Yet a third misconception is that government experience is a non-transferable commodity. This is patently false. The opportunity to deal with broad problems makes the man in government often invaluable to business and industry.

And the final misconception has to do with loyalty and moral and ethical integrity. No matter what some sensational headlines of the day may say, the overwhelming majority of those who

Based on the Stafford Little Lecture, "Public Service, Present and Future," delivered by the Secretary of the Army at Princeton University.

work in government are scrupulously honest, hard-working, loyal and normal men and women who come from every walk of life and are a true cross-section of America.

I do not believe that the moral standards of our public servants have changed for the worse. Moreover I believe that as time goes by these standards will become higher. The capable corps of public servants we seek must be imbued with a high sense of responsibility for the jobs they perform and we must insure their adherence to an extremely high code of ethics.

How can we develop such public servants? Neither blue laws nor isolation of government officials from the people they serve will do the job of keeping our government pure and efficient. Restrictive regulations may make the service muscle-bound while isolation may separate the public servant from American society like some Tibetan priesthood.

In this connection I would like to point out how one profession with which I am intimately familiar—the United States Army—has handled this problem.

What really motivates the typical Army officer to make his unique contribution to public service, which may mean giving his life for his country?

Consider a balance sheet which any man should analyze before investing in the Army as a career. On the debit side is his pay. This is certainly adequate although small when compared to civilian jobs of comparable responsibility. Also on the debit side is the unsettled life which he leads. At an age when most men in civilian life can look forward to uninterrupted family life, many Army officers and men must leave their families for the hardships and dangers of a foreign battlefront. Even in normal service, the Army man must regularly transplant himself and his family from one community to another. Behind him he leaves the friends he has made; the schooling of his children is interrupted. To some men, the necessarily disciplined life in the service is another debit.

Yet, despite these disadvantages, we continue to attract thousands of men of exceptionally high caliber who desire to make the Army their career. Why?

On the asset side of our balance sheet are many factors. Of these the most important I am convinced is the intense satisfaction which the typical Army man derives from his service. The Army offers a man, while still young, unsurpassed opportunities for experience in management and executive leadership that in the normal course of civilian life would come only after many

years. Thus he is afforded the opportunity to grow and mature rapidly in his job, to take on additional responsibilities as soon as he is capable of shouldering them and to acquire new skills as quickly as he is able to absorb them.

Take, for example, the demanding responsibilities which fall to an Army company commander—a young man usually in his early twenties. He has charge over some two hundred men and tens of thousands of dollars worth of weapons, equipment and supplies. He is responsible for the feeding, clothing and shelter of his men; for the maintenance and proper use of their weapons, vehicles and equipment. He must see that hundreds of individual items of supply are always on hand in adequate quantity. He must manage his fighting unit efficiently and lead it effectively in combat. I assure you that this young company commander is a very busy—and very satisfied—young man.

Moreover, in Army service as compared to business life, the element of chance in attaining success is greatly reduced. It is quite similar to the educational field where success comes as a result of long service and continuous high performance and is measured by personal satisfaction rather than dollars.

Men who reach the top in our Army in all probability would be highly successful in civilian careers also. The last few years have shown this to be true. Yet I wonder whether those who are now in business enjoy the same degree of deep personal satisfaction in their work which they enjoyed while in the service. General J. Lawton Collins, our Army Chief of Staff, has revealed this attitude in remarks he has made to me. Before going to West Point, General Collins was a promising young law student. "But," said the general, "although a lawyer's career appealed to me, the thrill of Army service—the opportunity to manage men —appealed to me more." As a lawyer turned Secretary of the Army, I find it difficult to dispute the thesis of the law student turned Army Chief of Staff.

When West Point was established in 1802 to train our professional Army officers, its founders clearly recognized the vital need of instilling in its students a high sense of duty and honor. There were many very pragmatic reasons for their concern over the character of these young men who were training to serve in the Regular Army. Our Nation's founders recognized clearly the need for professional soldiers who would instinctively put their country's interest above their personal ambitions. The founders knew only too well the dangers inherent in a military group which placed self-interest above the public welfare. They

knew too that our Army officers were responsible for our Nation's security. As public servants Army officers would be responsible for the expenditure of public funds not only for military purposes but for the varied engineering programs which early West Point graduates developed.

Recruiting government employees and imbuing them with a high code of ethics are two of the three major problems we face in developing a corps of high-caliber public servants. The third problem is their training, which is an especially pressing problem in the field of international affairs. Fortunately the Army has accumulated considerable experience in dealing with foreign peoples. When World War II ended, the Army had the manpower and the organization to perform the tremendous job of rehabilitation of allied and enemy countries and the re-education of the conquered enemy. The American soldier in Europe and the Far East was to prove that although his primary job was combat, he was also capable of rendering invaluable service in fields not even remotely connected with fighting.

I have talked to many Army officers in Japan and all agree that their highly successful solution to the challenging problems of rebuilding a devastated land was one of the most satisfying experiences in their service. They had participated in the speedy regeneration of a prostrate nation. A large share of the credit must go to their efforts with the Japanese school system which had been largely destroyed. The Army, with the help of top-notch civilian educators, rebuilt and re-oriented the educational system. By 1950 the Japanese had built forty-two thousand schools with almost nineteen million students and about six hundred and fifty thousand teachers.

The new constitution of Japan guarantees equal educational opportunity to all the people and provides for free compulsory education. It is significant that public opinion surveys conducted recently in Japan indicate that the Japanese people's confidence in their school system has vastly increased and that they consider it superior to that of pre-war days.

In Europe the same workmanlike job was done with a minimum of fuss and, considering the magnitude of the job, with almost unbelievable speed.

The reaction of these hard-working Army officers who labored on occupation duty after the excitement and stimulation of the war was over, is highly significant. In speaking of satisfaction derived from their work, they struck the keynote of what helps motivate the typical Army officer to make his contribution.

Our public officials are today called upon to make, in a matter of hours, far-reaching decisions of world import that formerly could await months of study. This calls for education, training and experience—as well as a knowledge of the facts—that permit the exercise of rapid judgment to produce a sound result.

Moreover, with the Soviet development of atomic power and the capacity to loose it on the American continent, one can say that the time lag between challenge and response has been reduced to the minimum, making infinitely more difficult the problem of military defense and of foreign policy planning. Today's military planners must consider the capabilities of an enemy who can strike faster, harder and at more targets than ever before. This has caused us to place a high premium on our intelligence services which must warn us in time to defend ourselves against attack and to prepare retaliatory blows. The increased military capabilities of a potential enemy have also inspired our foreign policy planners to work in intimate unison with our military planners.

We must establish the pattern we intend to follow as world leaders. I consider it self-evident that leadership in the world today cannot be a carbon copy of Nineteenth Century leadership. Americans have no inclination to think in terms of empires or imperialism. We are as far removed from the forms of power politics practiced then as we are from the empire concepts of a Caesar or a Napoleon.

Certainly, we would find it difficult to promote co-operation if we should exhibit such outmoded concepts among the free nations of the Western world. We would find it just as difficult if we tried to impose them on the peoples of Asia now experiencing a great upsurge in their will to be independent.

Instead, we are seeking properly to exercise our leadership responsibilities within free associations of nations grouped together for common purposes. In the United Nations and its subsidiary organizations, in the North Atlantic Treaty Organization and in the Organization of American States, among others, we have taken a leading role in building such groupings.

But we must not underestimate the difficulty of this new type of leadership. To make international organization the means of building a reasonable pattern of world stability requires more skillful diplomacy, more patient negotiations than a Machiavelli or a Metternich ever would have understood. It has required far greater numbers of public servants, with broader qualifications than ever before.

Another challenge to the public servant of today is to maintain the safeguards which the founding fathers built into our governmental machinery and at the same time to make that machinery flexible enough to function effectively in world crises.

Both in the American Constitution and in the democratic institutions of government which evolved from it, the major concern was to pull together the divergent interests of the great American continent into an effective but not too restrictive union. The separation of executive, legislative and judicial powers, the division of authority between state and Federal government and the right of unlimited debate are all guarantees that some important group within the Nation will not be suppressed and thereby produce a rupture of the whole. The peaceful preservation of this vast union, with the exception of the Civil War period, has been testament to the wisdom of our founding fathers.

Our public servants face a problem which must be shared also by our press and by our educators. This is the responsibility of explaining to the American people the problems our Nation faces in its role of world leader and champion in the crusade against world Communism.

They must, for example, show the American people how interrelated are the problems of leadership. It must be demonstrated that our own military build-up, the military aid to our allies, Point IV for the underdeveloped countries, production controls at home to insure conservation of strategic materials, and anti-inflation measures are all part of the same parcel. They are all included in what has been termed our "total diplomacy." To ignore one while carrying on the others is to weaken our entire program.

They must stress continuously the great need for continuity of effort on our part if our long-range programs for world peace and security are to be fruitful. Some of our actions are capable of short-term success; still others can only be measured in years and perhaps even decades. We must not be deluded into seeking quick and cheap results; to do so would be a certain path to disillusionment and defeat.

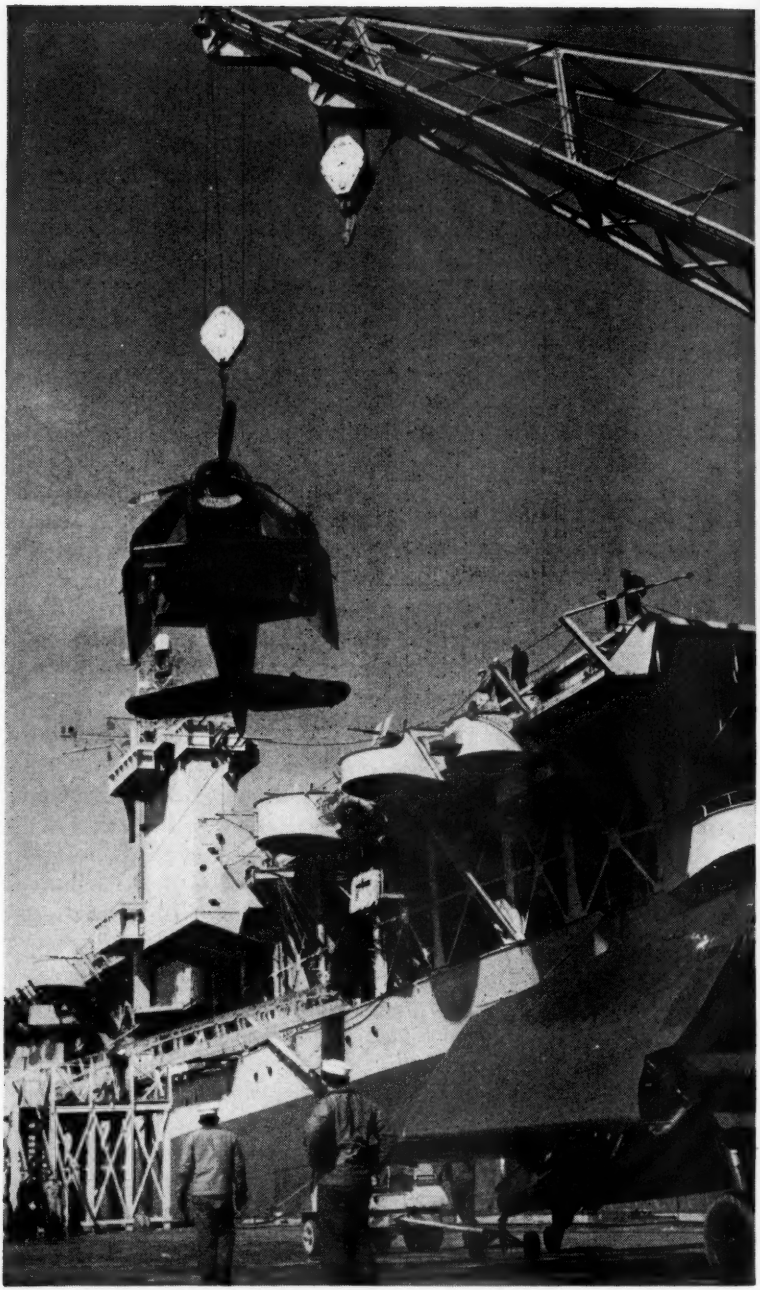
I am convinced that the American people are completely responsive to appeals such as these—that they clearly recognize today's challenge to the survival of this country as a free nation.

Convinced of the importance of his task and assured of our people's support, the public servant can find a sense of personal challenge in his job. He is involved in government during a

dangerous and exciting period in American history. It is a period of change, and the contradictions and frustrations accompanying change have produced anxieties which have sometimes been exploited by ignorant and prejudiced interests. Insinuations of treason may sometimes be made against those who have served loyally and faithfully. Sometimes able public servants like James Forrestal totally exhaust themselves in service to their country.

But the selfless devotion of these men has not been wasted. It provides a source of inspiration to those who come after them. The job Mr. Forrestal set out to do has been carried on.

Public service presents a real challenge to the young men and women of America. It can be likened to that of pioneer days. It is also like the challenge of the early days of the Republic when young Jefferson, Hamilton, Monroe and others met responsibilities far beyond their years. Today the capacity, the resourcefulness and the endurance required in public service have brought more and more young people to high position. They find in government and military life an opportunity for service which is both vital to their country and satisfying to themselves. They exhibit qualities of courage and vision characteristic of the best of America's youth. In their dedication to the cause of public service lies bright promise for America's capacity to meet the great challenge of our times.



American naval aircraft destined for France are loaded aboard the French carrier Dixmude *at Norfolk, Virginia.* U. S. Navy Photograph

ADVANCING MUTUAL SECURITY

MAJOR GENERAL GEORGE H. OLMSTED

IN GRADUATING exercises at numerous American service schools these days, smart foreign uniforms add a touch of color, a note of difference. Their wearers step along in lines of khaki, Navy or Air Force blue to accept diplomas and the traditional congratulations and handshake from the commandant and the speaker of the day. Sometimes foreign diplomats or United Nations visitors come to witness the ceremonies.

The foreign students have studied alongside United States Army, Navy and Air Force students. They have attended the same classes, heard the same lectures, performed the same training tasks, eaten at the same messes, taken part in team games and outside activities. Now they are ready to return to their own lands, to take back and propagate their newly acquired knowledge of American materiel being supplied to their own services under the Mutual Defense Assistance Program.

They come from most of the North Atlantic Treaty Organization (NATO) countries, and from others which are receiving American equipment under the provisions of various military assistance programs. They have been chosen not only for their ability but for their capability as teachers and instructors. Thus the skills and techniques they have acquired are being disseminated in ever-widening circles through Europe, Asia and South America.

There are six main methods employed today for training foreign nationals, each geared to the varying capabilities and needs of the individual country. Some nations have had experience with similar types of American equipment during World War II; others have had relatively little experience with modern military machines.

As the equipment and materiel needs of each country are established, plans are drawn up for education of personnel who

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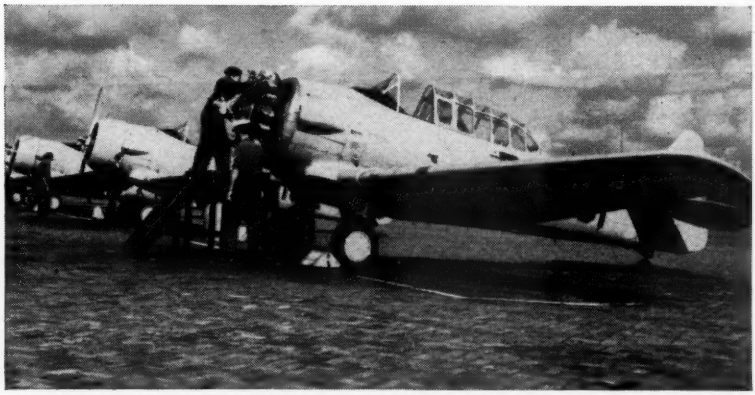
will be ready to receive the supplies. Every effort is made to provide only the necessary items to strengthen the particular country, then to assure that they will be properly used, effectively maintained, and integrated with existing materiel.

Requests for training originate with the country concerned. Each request is screened and reviewed by the Military Assistance Advisory Group (MAAG) assigned to, and stationed in, the country; each is passed on to the Joint Allied Military Advisory Group in the cases of Western European NATO countries or directly to the Departments of Army, Navy or Air Force, in the case of other countries. After further screening and evaluation, the service Departments consolidate all of the requirements and then arrange for student quota spaces with the agencies controlling the service schools.



Ground crewmen of Royal Netherlands Air Force familiarize themselves with American T-6 trainers received through MDAP. U. S. Air Force Photograph

Wherever possible the foreign national goes to a training installation or service school in or close to his own country. (See "Training Our Allies Under MDAP," December 1950 DIGEST.) Within the European Command, trainees from all of the NATO countries have attended various Army and Air Force schools established in Germany to train American personnel stationed there.

In many instances, however, it is considered desirable to send the student to a service school in the United States, especially when no appropriate American or foreign training center exists abroad. Since the program was started in 1949 some sixteen thousand allied students have been trained in American

service schools, either in the United States or in foreign countries. Fiscal year 1953 is expected to be the high point with anticipated attendance of more than twenty-three thousand.

This year over twelve hundred foreign air force personnel are learning to pilot American planes—mostly fighter types which are being supplied to European countries under plans drawn up by the Joint Chiefs of Staff. Some two thousand are enrolled in Air Force technical courses given by Air Training Command schools. Others are attending the squadron officers course at Air University, Maxwell AFB, Alabama, or the explosives ordnance disposal course at Indian Head, Maryland.

Besides attendance in formal classes, either in this country or overseas, the next most important method of training is the apprentice type, usually called OJT—on-the-job training. This may be a separate form of training or a phase in conjunction with a formal course of classroom instruction.

Still another method is by utilization of Mobile Training Teams of American technical service personnel who give on-the-spot instruction in maintenance and operation of specialized or complicated equipment. Four officers and six enlisted men—all specialists—make up a typical Air Force Mobile Training Team. The team will visit several installations; at each it develops specialists to serve on additional teams—specialists in engine operation and maintenance; electrical systems; airframe maintenance and repair; engine instrument operation and repair; ordnance equipment; and installation, maintenance and repair to include guns, bombs and rockets. Each team carries cutaway models of vital operating parts, diagrams, charts, films, slides and manuals. Once a team has fully trained several replacement teams, the training aids are turned over to a picked group of replacements who will in turn teach maintenance personnel at bases receiving the aircraft.

Besides the Mobile Training Teams, skills are disseminated in the field by technical representatives and specialists—industrial technicians who provide field instruction under contracts with the Army, Navy or Air Force. Services of these factory representatives are closely co-ordinated with the delivery dates of new equipment.

In addition to the four main methods of instruction, the various services keep up a continuing flow of training aids, films, manuals, technical bulletins, cutaway models, diagrams, mock-ups and sometimes elaborate training apparatus. This instructional material assists foreign military personnel more readily

similar problems in the future. In both the Army and Air Force schools, field trips are made to industrial centers and factories manufacturing American equipment.

The Navy provides two types of training—for individuals at the various service schools and for groups aboard the ships they will ultimately operate. Individual training is similar to the Army and Air Force programs with courses in such subjects as electronics, engines, gunnery, fire control, mine warfare and others.

Most of the Navy training, however, takes place aboard vessels that are being prepared for delivery to allied nations. Crewmen are trained as a group for a five week period. The first two weeks are spent in port with American sailors working side by side with their foreign counterparts readying the ship for sea. The last three weeks are given over to actual underway drills and training exercises.

Foreign gun crews who will man the ship report to the Navy air defense training center while other units of the group receive instruction at the fleet training center. The latter are trained in fire-fighting, repairs, shallow-water diving repairs, anti-submarine warfare, radar and other types of electronics. Liaison officers from the allied navy usually are assigned to assist.

During the three week underway indoctrination, the crews stage realistic drills, simulate collisions, put out smudge fires, stage man-overboard drills (using dummies) and undergo an "attack" at a submarine rendezvous. "Graduation" takes the form of a full dress inspection on departure.

All in all, the program of training foreign soldiers, sailors and airmen alongside American students has brought results far beyond the mere statistical total. In effect, the results transcend the primary objectives of assuring that American war materiel will be properly and efficiently utilized when it arrives overseas.

As foreign students take their places as instructors and operators of complex equipment, the impact of the entire program is continually expanding and multiplying. Increased understanding, mutual appreciation and respect for the qualities and capabilities of participating nationalities have been generated. Reciprocal benefits, too, have been realized. Increasingly, reports from our own service schools show that foreign students have contributed their special talents and unique insights toward the improvement of established methods and techniques.

NAVAL CO-OPERATION IN THE MEDITERRANEAN

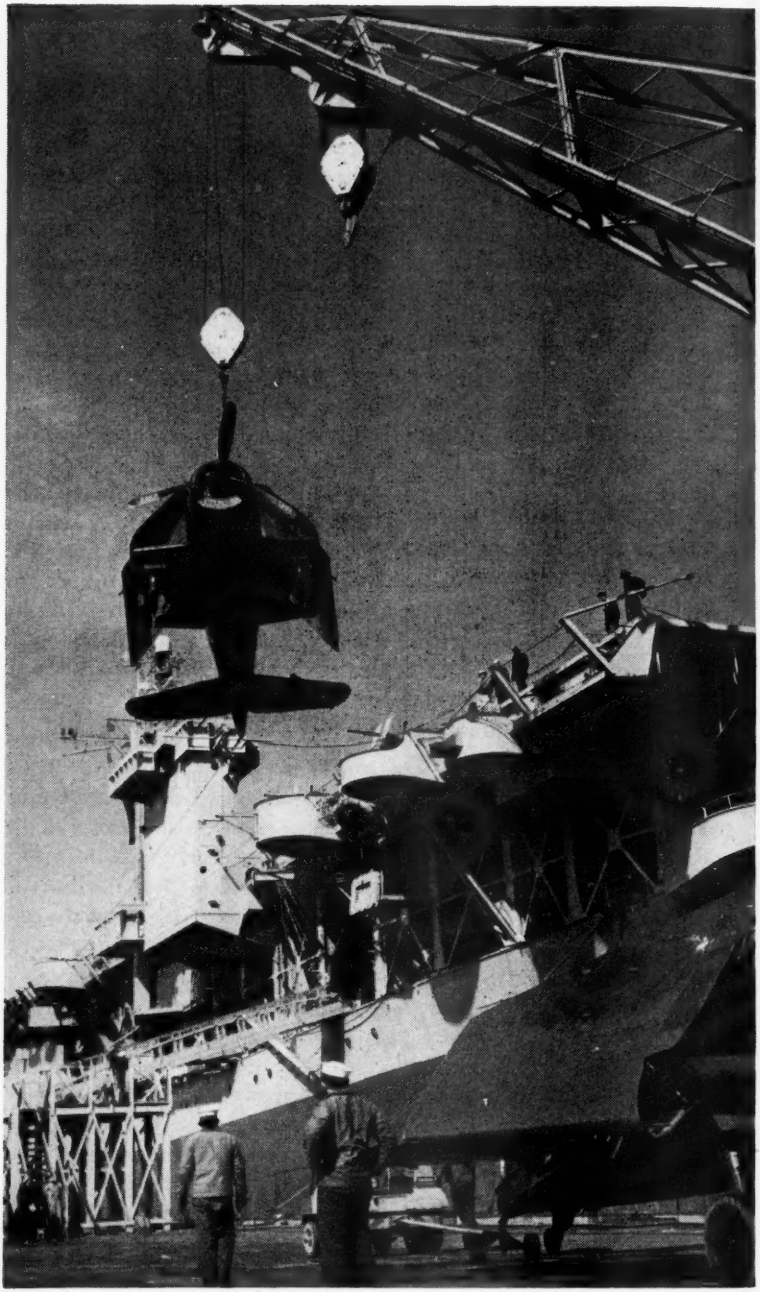
FROM the shadowy spirit halls where naval commanders of the past gather to discuss half-forgotten battles in the manner of old soldiers and sailors everywhere, the ghosts of all who ever commanded a ship in the Mediterranean must have looked on with considerable amazement as fleets of four nations recently went through the intricacies of a major maneuver, appropriately titled Operation Grand Slam, in that great inland sea.

Probably it was more than just the new weapons—the airplanes, submarines, radar, the crackling wireless, electronic sounding devices and all the rest—that amazed them. Even more bizarre was the very notion that fleets representing nations who at one time or another had been rivals in the Mediterranean, were now engaged in a great maneuver to determine whether they could work together under a single command, despite differences in languages, customs, procedures and equipment. Yet that, in essence, was the main purpose of the operation.

Five fleets embodying ships of four nations were represented in the maneuver conducted under the direction of Admiral Robert B. Carney, USN, Commander in Chief, Allied Forces Southern Europe. They were the United States, British and French Mediterranean fleets, the Italian fleet and units of the British home fleet. Land based units of United States, French and Italian air forces also took part.

For centuries the Mediterranean has been a strategic inland sea, both a barrier to and a bridge for invasion. Phoenician traders and war vessels, Persians threatening Greece, Roman triremes proceeding against Carthage—all have sailed on it. The Moors controlled it, then Crusaders sailed over it and the Italian city states fought the Turks to dominate it. Frigates of the young American republic clashed here with the Barbary pirates. England fought to maintain its life-line of empire through these waters and more recently the Axis powers desperately sought its control in World War II. Today the Mediterranean continues of vital strategic importance as the free world's link to Italy, Greece, Turkey and the Middle East.

Grand Slam was the most extensive peacetime naval training



American naval aircraft destined for France are loaded aboard the French carrier Dixmude *at Norfolk, Virginia.* U. S. Navy Photograph

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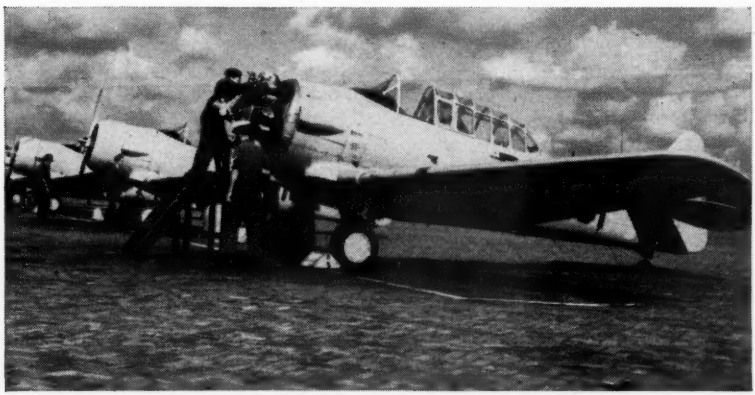

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Still another method is by utilization of Mobile Training Teams of American technical service personnel who give on-the-spot instruction in maintenance and operation of specialized or complicated equipment. Four officers and six enlisted men—all specialists—make up a typical Air Force Mobile Training Team. The team will visit several installations; at each it develops specialists to serve on additional teams—specialists in engine operation and maintenance; electrical systems; airframe maintenance and repair; engine instrument operation and repair; ordnance equipment; and installation, maintenance and repair to include guns, bombs and rockets. Each team carries cutaway models of vital operating parts, diagrams, charts, films, slides and manuals. Once a team has fully trained several replacement teams, the training aids are turned over to a picked group of replacements who will in turn teach maintenance personnel at bases receiving the aircraft.

Besides the Mobile Training Teams, skills are disseminated in the field by technical representatives and specialists—industrial technicians who provide field instruction under contracts with the Army, Navy or Air Force. Services of these factory representatives are closely co-ordinated with the delivery dates of new equipment.

In addition to the four main methods of instruction, the various services keep up a continuing flow of training aids, films, manuals, technical bulletins, cutaway models, diagrams, mock-ups and sometimes elaborate training apparatus. This instructional material assists foreign military personnel more readily

to understand maintenance and operation of equipment destined for their home countries.

A sixth method of training is by attendance of key military personnel as observers at oversea military maneuvers. Similarly orientation visits to the United States are arranged for such personnel. This step is regarded as important in gaining acceptance of United States maintenance and operating standards.

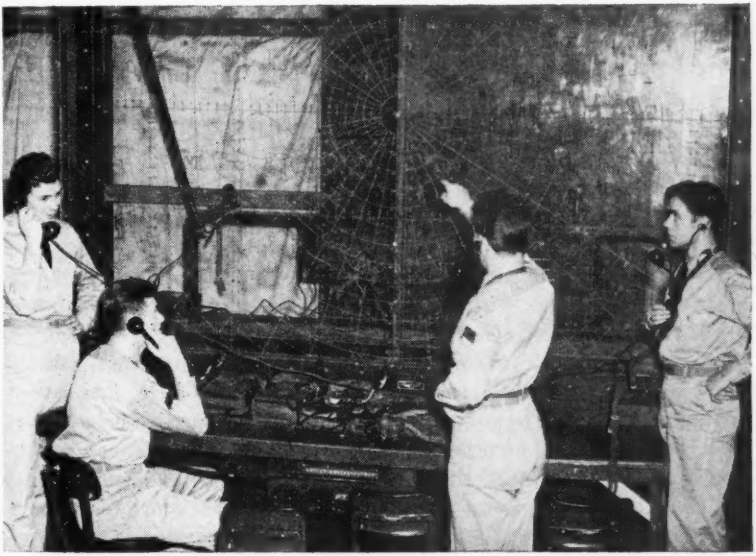
All prospective trainees are carefully screened and selected by their own defense establishments, with English language qualification being one of the requirements. Upon arrival at an American school, the student is usually integrated with other NATO and United States trainees for billeting, messing and class assignment. Every effort is made to place him in association with American students or allied officers from a different country. This gives the student more contact with other nationals and helps to foster international understanding.

Typical of the procedures followed in handling foreign students is the Fort Benning voluntary plan whereby an American officer becomes a sponsor for some individual foreign student. The sponsor helps the allied student establish himself and overcome the first problems of adjustment; he acts as his host at informal dinners and social events and generally functions both in and out of class as mentor, adviser and guardian angel.

In the Air Force the pilot training program of thirteen months duration fills one of the most critical needs. Students receive over two hundred and sixty-five hours of flying time and extensive mental and physical training. The prospective pilots first receive a pre-flight course followed by basic pilot training. Others take instruction in navigation, fighter gunnery, helicopter pilot, aircraft controller, instrument pilot and combat crew operations. Most students in the technical training phase of the Mutual Defense Assistance Program are enrolled in radio, radar, aircraft mechanics and weather courses. Technical training, however, is not emphasized as highly as pilot training because many of the countries are able to train their own technicians; in addition Mobile Training Teams are used extensively abroad.

In the Air Force, allied student affairs are handled by a foreign liaison officer in each training squadron. These liaison officers act as official greeters at each base and make arrangements for billeting, pay and other matters, including extra instruction if required. Liaison officers encountering unique problems pass on their experience to others as an aid in solving

High-ranking Danish officers discuss problems in tank gunnery with a United States Army major at Fort Knox, Kentucky. U. S. Army Photograph



Norwegian airmen gain experience in aircraft plotting as part of a radar operators' course at Keesler AFB, Mississippi. U. S. Air Force Photograph

similar problems in the future. In both the Army and Air Force schools, field trips are made to industrial centers and factories manufacturing American equipment.

The Navy provides two types of training—for individuals at the various service schools and for groups aboard the ships they will ultimately operate. Individual training is similar to the Army and Air Force programs with courses in such subjects as electronics, engines, gunnery, fire control, mine warfare and others.

Most of the Navy training, however, takes place aboard vessels that are being prepared for delivery to allied nations. Crewmen are trained as a group for a five week period. The first two weeks are spent in port with American sailors working side by side with their foreign counterparts readying the ship for sea. The last three weeks are given over to actual underway drills and training exercises.

Foreign gun crews who will man the ship report to the Navy air defense training center while other units of the group receive instruction at the fleet training center. The latter are trained in fire-fighting, repairs, shallow-water diving repairs, anti-submarine warfare, radar and other types of electronics. Liaison officers from the allied navy usually are assigned to assist.

During the three week underway indoctrination, the crews stage realistic drills, simulate collisions, put out smudge fires, stage man-overboard drills (using dummies) and undergo an "attack" at a submarine rendezvous. "Graduation" takes the form of a full dress inspection on departure.

All in all, the program of training foreign soldiers, sailors and airmen alongside American students has brought results far beyond the mere statistical total. In effect, the results transcend the primary objectives of assuring that American war materiel will be properly and efficiently utilized when it arrives overseas.

As foreign students take their places as instructors and operators of complex equipment, the impact of the entire program is continually expanding and multiplying. Increased understanding, mutual appreciation and respect for the qualities and capabilities of participating nationalities have been generated. Reciprocal benefits, too, have been realized. Increasingly, reports from our own service schools show that foreign students have contributed their special talents and unique insights toward the improvement of established methods and techniques.

NAVAL CO-OPERATION IN THE MEDITERRANEAN

FROM the shadowy spirit halls where naval commanders of the past gather to discuss half-forgotten battles in the manner of old soldiers and sailors everywhere, the ghosts of all who ever commanded a ship in the Mediterranean must have looked on with considerable amazement as fleets of four nations recently went through the intricacies of a major maneuver, appropriately titled Operation Grand Slam, in that great inland sea.

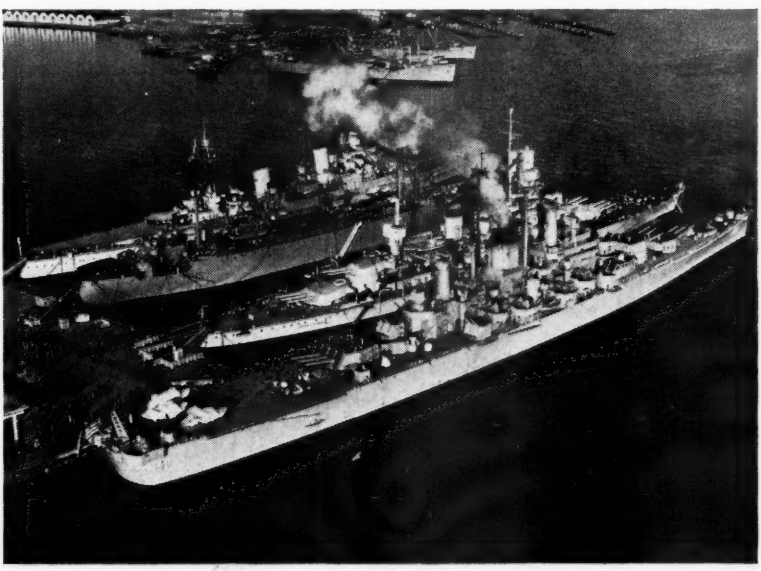
Probably it was more than just the new weapons—the airplanes, submarines, radar, the crackling wireless, electronic sounding devices and all the rest—that amazed them. Even more bizarre was the very notion that fleets representing nations who at one time or another had been rivals in the Mediterranean, were now engaged in a great maneuver to determine whether they could work together under a single command, despite differences in languages, customs, procedures and equipment. Yet that, in essence, was the main purpose of the operation.

Five fleets embodying ships of four nations were represented in the maneuver conducted under the direction of Admiral Robert B. Carney, USN, Commander in Chief, Allied Forces Southern Europe. They were the United States, British and French Mediterranean fleets, the Italian fleet and units of the British home fleet. Land based units of United States, French and Italian air forces also took part.

For centuries the Mediterranean has been a strategic inland sea, both a barrier to and a bridge for invasion. Phoenician traders and war vessels, Persians threatening Greece, Roman triremes proceeding against Carthage—all have sailed on it. The Moors controlled it, then Crusaders sailed over it and the Italian city states fought the Turks to dominate it. Frigates of the young American republic clashed here with the Barbary pirates. England fought to maintain its life-line of empire through these waters and more recently the Axis powers desperately sought its control in World War II. Today the Mediterranean continues of vital strategic importance as the free world's link to Italy, Greece, Turkey and the Middle East.

Grand Slam was the most extensive peacetime naval training

The French aircraft carrier Lafayette *was among ships of four nations participating in the naval exercises.* U. S. Navy Photograph



United States, British and Italian flagships dock at Naples after taking part in Operation Grand Slam. U. S. Navy Photograph

exercise ever held in the Mediterranean. Not only were the warships of four participating nations involved, but a large number of peaceful merchant ships were enlisted to act as submarine "targets," which the fleets sought to protect from the onslaughts of the undersea marauders. This practical training was considered especially important because, as Admiral Carney pointed out, allied shipping suffered considerably in the early days of World War II for lack of adequate anti-submarine procedures and tactics.

Planning for Grand Slam began several months before the actual maneuvers in March 1952. Problems included logistics, escort, surface and underwater attack and defense, and aerial bombardment. Three main objectives were involved—to provide tactical training in combined operations over a long period, to test communications under simulated wartime conditions, and to test the ability of allied ships and aircraft to work jointly.

Four main convoys formed the connecting thread of the maneuvers. One started from Malta, another from Gibraltar, still another from Oran and the fourth from west of Sardinia. The groups, composed of ships of all the participating nations, received surface and air protection from the combined naval and air units. Airplanes also operated from shore bases in northern Africa, Malta, Gibraltar, Southern France and Italy, with units of French, Italian and United States air forces taking part.

The force which formed up near Sardinia probably was the biggest naval task force ever to be assembled in peacetime. A feature of the entire maneuver was the placing of a strong bombardment group under command of an Italian admiral who ten years ago was enemy to the Americans and English in those waters. This group bombarded the north-east coast of Sardinia in a display of co-ordinated naval tactics.

During nine days of the maneuvers, the four convoys plowed through the Mediterranean toward their assigned ports while United States, French and British submarines played the part of attackers stalking their quarry. Submarine runs were made on virtually every one of the approximately two hundred combatant ships taking part and on ninety-two independent merchant ships. The convoys and merchant ships were protected by two hunter-killer groups built around carriers—and evaluations officers have tentatively credited the anti-submarine forces with sinking all but one of the attacking submarines at least twice!

In an outstanding action in the submarine phase of the maneuver the British submarine *Trenchant* slipped undetected

into the harbor at Oran where a French and United States hunter-killer group was preparing to leave. Other submarines struck at the Malta to Gibraltar convoy on the opening day as they attempted to sortie out of Malta.

In the air, two main carrier task forces carried on operations throughout most of the exercise. One consisted of British and Italian units under a British admiral; the second of French and United States ships under a United States admiral. Carrier planes constantly ranged over the Tyrrhenian Sea, attacking each other as well as the various convoys in the area.

Other planes, including light bombers of the United States Twelfth Air Force, struck at the convoys from Southern France while United States, British and French planes provided air protection; these latter also made air attacks from North African bases. In one aerial operation, more than two hundred planes flew up to five hundred miles in the Stromboli "attack." Air discipline was particularly evident despite the fact that planes of four nations were flying almost wingtip to wingtip.

New communications procedures of North Atlantic Treaty Organization countries received a thorough "combat trial" during the maneuvers. Speed and accuracy of communications grew with each passing day. Typical of the information transmitted and symbolic also of the entire maneuver was one message received from an American carrier: "United States Navy planes spotted French 'enemy' submarine making simulated strike on convoy. Planes guided in British units escorting the Italian convoy for a successful attack on French submarine."

Techniques for refueling ships of the various fleets, utilizing methods worked out by the U.S. Navy, were given an acid test under simulated combat conditions. Refueling was carried out half way through the maneuver, while "enemy" submarine and air group commanders made every effort to locate and destroy the vulnerable refueling forces. Another "first" was recorded as the United States method of refueling while underway was accomplished successfully on an international basis.

Besides watching the exercises unfold from his flagship USS *Adirondack* in Naples harbor, Admiral Carney made three flights over the main units to observe at first hand the conduct of the maneuvers. He witnessed the Malta convoy steaming through the narrow waters between Africa and Sicily; he watched the cruiser bombardment force off Sardinia and on the final day he flew with the strike planes in a simulated attack on Stromboli, a volcanic island north of Sicily.

The Stromboli attack, incidentally, was significant because of the speed with which a change order was executed. On take-off, the planes had as their original target the Tremiti Islands off the east coast of Italy; but once in the air, fog settled in over the target area and the operation plan was changed, thus putting the communications system to a thorough test. The fact that the air strike came off without a hitch is indicative of the fine co-ordination achieved among the four nations. During this simulated attack, Italian land-based aircraft provided protection along the southern coast of Italy while American planes from the carrier *Cabot* gave air cover to the task force.

British planes prepare for the final phase of the operation—an air strike against the island of Stromboli. U. S. Navy Photograph

After the completion of the "at sea" phase of Grand Slam, flagships of the fleets filed into Naples harbor amidst the booming of salute guns resounding in the ancient Mediterranean port. A roll call of the assembled ships underscores the international ramifications of the maneuver. Tied up at the main wharf, side by side, were the USS *Adirondack*, Admiral Carney's flagship; the British cruiser HMS *Liverpool* flying the flag of Admiral Sir John Edelsten, Commander in Chief of British Mediterranean Forces; the Italian battleship *Andrea Doria* with Vice Admiral Giuseppe Manfredi, Commander in Chief of the Italian Fleet; the French cruiser *Gloire* with Vice Admiral Louis Pothau,

Commander in Chief of French Forces afloat; and the cruiser USS *Newport News* with Vice Admiral Mathias B. Gardner, Commander of the U.S. Sixth Fleet in the Mediterranean.

Close by in the harbor were the French carrier *Lafayette* with Vice Admiral Antoine Sala, Commander in Chief of French Mediterranean Forces, and Rear Admiral Edouard Jozan, French Mediterranean Air Commander; the French cruiser *Georges Leygues* with Rear Admiral Joseph Laurin, French cruisers commander; the Italian *Garibaldi* with Rear Admiral Umberto Rouselle, Commandant Second Division of the Italian Navy; and the Italian destroyer *Carabiniere* with Admiral Massimo Girosi, Commander in Chief designate of the Italian Fleet and Commander of the Italian Zone of Responsibility under Southern Europe NATO naval organization.

In all about three hundred naval officers, including more than forty admirals, and observers from SHAPE and various NATO countries assembled for the critique. As fleet commanders and others poured ashore, word was received that General of the Army Dwight D. Eisenhower was stopping at Naples en route back to SHAPE following a trip to Greece and Turkey.

Admiral Carney opened the critique, stating that the maneuver had not only fulfilled its intended purpose but had developed some remarkable and significant realism. "Intended as a technical and tactical exercise, and not being predicated on any particular strategic situation, it nevertheless unfolded as a preview of what might well happen in the event of actual hostilities," the Admiral pointed out.

Many rough spots were apparent during the maneuver—as was expected—and plans now are being mapped to remedy them. But aside from its geographical extensiveness and the magnitude of the forces involved, Grand Slam was a profoundly impressive demonstration of the willingness and ability of the several navies to work together smoothly as an allied team.

General Eisenhower told the assembled naval officers, "The real value of Grand Slam lies in the confidence you have learned to have in each other while planning and working and operating together. I feel that this mutual confidence, based on your personal knowledge of each other's character and capabilities, will prove more valuable in the future than even the technical experience you have gained."

THE NATIONAL WAR COLLEGE

LIEUTENANT GENERAL HAROLD R. BULL

SOMEWHAT paradoxically, a well-known editor recently described the National War College as a peace college. Although there is considerable basis for this statement, actually neither "war" nor "peace" alone is sufficiently descriptive. It is the function of the College to train high level officers of the Army, Navy and Air Force and of certain Government agencies on a broad scope beyond purely military lines. That portion of the training which stresses such military subjects as global strategy and inter-departmental command problems is appropriately termed a war college. But since the curriculum also includes economics, international politics, international organization, foreign policy and the study of geographical areas, the institution is indeed in many respects a peace college as well. The entire curriculum is concerned with the study of national strategy which has been defined by one authority as the art and science of employing all resources to accomplish national objectives.

The necessity for broad training of military and State Department officers became apparent during World War II when the Nation's military and diplomatic problems mushroomed on a global scale and increased in complexity. Military strategists found that they could not limit their thinking to purely military factors; an understanding of the political and economic aspects was often important. State Department officers likewise found invaluable an appreciation of the Armed Forces roles, capabilities and problems.

The need for trained personnel to cope with the broad problems which transcended any one service or department was pointed out by the wartime State-War-Navy Co-ordinating Committee. And while the Army-Navy Staff College successfully promoted joint education in training high level staff offi-

LIEUTENANT GENERAL HAROLD R. BULL, USA, is Commandant, National War College.

cers during World War II, the closely integrated nature of wartime operations demonstrated the urgency of continuing joint service education in the post-war era.

Giving substance to various recommendations for the establishment of a permanent program for post-war military education, the Joint Chiefs of Staff in July 1946 decided to establish a National War College "to prepare selected personnel of the Armed Forces and the State Department for the exercise of joint high level policy, command and staff functions, and for the performance of strategic planning duties in their respective departments," and "to promote the development of understanding of those agencies of government and those factors of power potential which are an essential part of a national war effort." The College occupies facilities at Fort Lesley J. McNair which have previously served as the home of the Army War College (1907-1940), Army General Headquarters (1940-1942) and Army Ground Forces Headquarters (1942-1945). The elm-lined streets, excellent library, auditorium and recreational facilities provide a setting equaled only by our leading universities.

Initially the Joint Chiefs of Staff invited the State Department to participate in the newly established College. In 1948 representation was broadened to include senior representatives of the Commerce and Treasury Departments, the Bureau of the Budget and the Central Intelligence Agency. More recently representatives of the Department of Defense and the Mutual Security Agency have been in attendance.

Now in its sixth academic year, the National War College provides ten months of training in twenty-two courses ranging in length from one to four weeks each. Instruction is by an integrated faculty of military and civilian experts and by lectures and discussions by outstanding authorities. There are no grades, no examinations, no "approved" solutions. It is felt that the maturity of the student body, the high degree of selectivity exercised and the professional zeal of each individual make unnecessary the use of tests or competition to stimulate effort.

The backbone of the instruction consists of a series of lectures closely correlated with the subject areas under study. Each lecturer, a specialist in his field, sets up a frame of reference or point of departure for discussion and study of his topic.

Morning sessions find the students gathered in the auditorium listening to a lecturer—always an outstanding civilian or military authority. The roster of speakers during the first five days of the current academic year illustrates the caliber of

those participating: the Honorable Dean Acheson, Secretary of State; Lieutenant General Albert C. Wedemeyer, USA, Retired; Mr. Charles E. Bohlen, State Department Counselor; Dr. Joseph E. Johnson, President of the Carnegie Endowment for International Peace; and Mr. Gordon Dean, Chairman of the Atomic Energy Commission. Lectures of opportunity are also scheduled when a foreign dignitary or prominent personage visits the Nation's capital, bringing a realistic view of world problems.

The formal fifty-minute lecture is followed by a half hour question period during which students ask any and all questions with no holds barred. The searching queries raised show that the students maintain a receptive but critical attitude throughout. Such an attitude, it is continually emphasized, is a prerequisite for serious thinking and for evaluating the varied facts and opinions presented for discussion. Freedom of thought and judgment, the presentation of an independent point of view, and formulation of one's own philosophy are encouraged. At the same time the need for a friendly and objective attitude is emphasized to foster co-operation among the services.

This approach even extends to the "coffee hour" which, instead of being a period of relaxation, has evolved into a time for informal but highly stimulating discussion of the day's lessons. At these sessions, Army and Air Force colonels, Navy captains, and officers of the various Government agencies meet in groups of twenty-four. A civilian faculty member generally presides during the first semester; later military faculty members and sometimes students themselves furnish the leadership. The visiting lecturer usually sits in on one of the informal discussion groups and assists in probing the numerous issues raised.

For the formal phase of instruction, students are organized into integrated groups of six to work out committee problems in each course. Committee assignments are rotated to provide a maximum number of associations in intimate team work. The twelve courses given during the first semester are concerned primarily with international politics, economics, government, the formulation of foreign policy and area studies—all essential to the work of the second semester—while the second semester courses deal primarily with national and military strategy, new weapons and capabilities, logistics, planning and broad national security problems. A Joint Logistics Planning course is conducted in co-operation with the adjacent Industrial College of the Armed Forces. Students from the Industrial College also attend many of the War College lectures.

U. S. Army Photograph

The National War College at Fort Lesley J. McNair, Washington, D. C.

Afternoon sessions find the students analyzing "policy" problems just as if they were desk officers in their Departments or Foreign Service officers in the field. Each problem usually engages the class from two to three weeks, after which selected solutions are presented by the students.

At times throughout the academic year students may be working on committee and individual problems concurrently. The former are very much like those which top level planners meet in formulating and implementing national policies. They are designed to evoke thought, to make the students aware of the many facets to be considered and to give practice in co-operatively organizing and working out joint or inter-service or inter-departmental solutions. At the conclusion of each course, each committee submits its report orally or in manuscript form.

Each student in addition performs individual research and study. During the first semester, he prepares a paper on some particular geographical area or a world-wide politico-economic problem. His second semester paper is concerned with national or military strategy or problems related thereto.

At the beginning of each course, the student is given an outline of concurrent reading assignments in periodicals, original source documents and books. One category of outside readings covers essential background material and is required; a second lists optional readings which provide supplementary information and contrasting points of view.

During the first semester, about three fourths of the students take a voluntary course in public speaking given by professors from near-by universities. About two hours each week are devoted to motion pictures directly bearing on the courses.

Visits by the entire class to important service centers in the United States or overseas are an essential part of the educational process. There the students see joint and unified command principles applied practically; they are able to discuss on the ground the politico-military problems confronting Armed Forces commanders and gain a better understanding of service missions.

The National War College is administered by the Commandant with three Deputies. Each of the top military positions is rotated among the three services. The Commandant, selected by the Joint Chiefs of Staff, is this year assisted by Rear Admiral E. P. Forrestel, USN, Deputy for Administration; Major General John M. Weikert, USAF, Deputy for Academics; and Mr. Edward Page, Jr., a Class One Foreign Service officer in the Department of State, Deputy for Foreign Affairs.

U. S. Army Photograph

The National War College at Fort Lesley J. McNair, Washington, D. C.

In addition to the Commandant and Deputies, the faculty includes three military faculty committees of four members each and a five-member Strategy Research and Analysis Committee. The military faculty committees are responsible for the organization and content of the college courses. They plan and supervise all academic work so as to insure the greatest possible amount of co-operative planning in every stage of preparation. The mission of the newly created Strategy Research and Analysis Committee is to promote a better understanding of national strategy through the study of military, political, economic and psychological elements and their applications.

An International Affairs Committee composed of five civilian professors from leading colleges and universities assists in the preparation and conduct of the first semester courses, advises the students on their individual and committee studies and leads their discussion groups. Through their close daily association with the class, they are able to contribute much from their fund of general and special knowledge.

A Board of Consultants, composed of outstanding civilians and experienced military leaders, provides an invaluable pool of experience which has been utilized in organizing and improving the curriculum. The present Board includes Mr. Hamilton Fish Armstrong, Jr., Editor, *Foreign Affairs;* Dr. John S. Dickey, President, Dartmouth College; Dr. Hardy C. Dillard, Professor of Law, University of Virginia; Dr. Sherman Kent, Yale University; Dr. Wallace Sterling, President, Stanford University; Dr. George D. Stoddard, President, University of Illinois; Mr. Norman Burns, Director, Foreign Service Institute; Vice Admiral Richard L. Conolly, USN, President, Naval War College; Major General John DeF. Barker, USAF, Deputy Commanding General, Air University; and Brigadier General Gerald J. Higgins, USA, Chief of Organization and Training Division, G3.

Reviewing the accomplishments of the National War College, it is apparent that both the courses and methods of instruction have proved successful. Comments of graduates indicate that much has been accomplished in enlarging the vision of individuals and in inspiring mutual confidence and team work among the services. The value of the National War College program is further underscored as its graduates in increasing numbers are being called upon to fill important assignments world-wide on service-integrated teams.

RESEARCH BY ROCKET

CAPTAIN GERNARD D. DEAN

WHAT is the source of cosmic rays? What is the density of air in the stratosphere? How cold—or hot—is it in the outer reaches of space? What is the composition of the atmosphere a hundred miles above the earth's surface? What is the velocity and direction of the wind at that level? What does the earth look like from such an altitude? Instrument-laden rockets capable of rising to previously unattainable heights are providing scientists with the answers.

The Army Signal Corps is participating in the rocket research program with other Department of Defense agencies. Many useful discoveries are resulting from studies in such fields as cosmic rays and stratospheric air density and temperatures. Samples of air are taken at various altitudes, wind velocity and direction are measured and gaseous composition and high altitude photographic studies are made—all by rocket.

The Signal Corps has concentrated on two principal experiments—measurement of upper air temperatures and collection of upper air samples to determine its composition. Measurement of wind speed and direction at heights beyond the reach of meteorological balloons also has been achieved.

Two totally different methods of measuring temperatures at high altitudes have been employed successfully. One system is based on the principle that the speed of sound is influenced by temperature. The speed of sound is measured through a series of explosions of small bombs which are ejected and detonate outside the rocket at closely timed intervals during its flight. Microphones on the ground "hear" each burst and the exact time of arrival is recorded by photoelectric cells. At the same time, radar and optical equipment determine the precise location of each explosion in space. The differences in times of arrival of successive detonations and their positions along the rocket's trajectory indicate the speed of sound through

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CAPTAIN GERNARD D. DEAN, Signal Corps, is in the Radar and Meteorological Branch, Engineering and Technical Division, Office of the Chief Signal Officer, Department of the Army.

the layer bounded by each burst and thus the mean temperature of the air for each stratum may be calculated.

Ejection of the explosives is controlled by a timing mechanism that is set before the flight. Photo-cell reactions in the rocket are transmitted electronically to the earth along with other pertinent data. During several night test flights which have been made, darkness facilitated the use of wide angle view cameras on the ground to record the star trail left by the bursts. The star positions are used for orientation purposes and, by using two cameras at known locations, the position of each explosion is determined. Considerable information on the atmospheric temperature structure has been acquired by this technique.

In this type of test it was discovered that the speed and direction of wind at high altitudes may be determined from the direction of arrival at the ground of sound waves emanating from the explosions. In stationary air, the sound waves arrive from the same direction as the light from the bursts. In moving air, the sound waves appear to come from a source removed from the actual point of explosion by a distance which varies according to the wind velocity. Thus wind speed and direction in the upper atmosphere may be computed layer by layer.

Another method for measuring temperatures above one hundred thousand feet has been used successfully by the Engineering Research Institute of the University of Michigan, currently carrying on studies under a Signal Corps contract. This system requires knowledge of the angle made by the shock waves off the nose of the rocket during flight. A unique means of measuring these waves has been devised. A series of four or more pressure-sensitive probes move back and forth parallel to the longitudinal axis of the rocket outside its nose. As these probes pass through the shock waves, the pressure change noted by the probes is amplified and recorded on a magnetic tape recorder in the rocket. At the same time this data is telemetered to a recording station on the ground. From their knowledge of the angle of the probes and of the rocket's location and speed, scientists are able to calculate the air temperature along the rocket's upward path.

Data from the two types of tests have been consolidated to construct a composite upper atmosphere temperature curve for 32° north latitude. This mean curve shows the temperature decreasing to a minimum of about minus 75° Fahrenheit at ten miles altitude with a uniform warming above this level to ap-

proximately 30° above zero at a thirty mile altitude. Beyond this the temperature appears to fall until a minimum is reached near the fifty mile altitude. Thereafter the temperature increases throughout the region that can be probed with rockets.

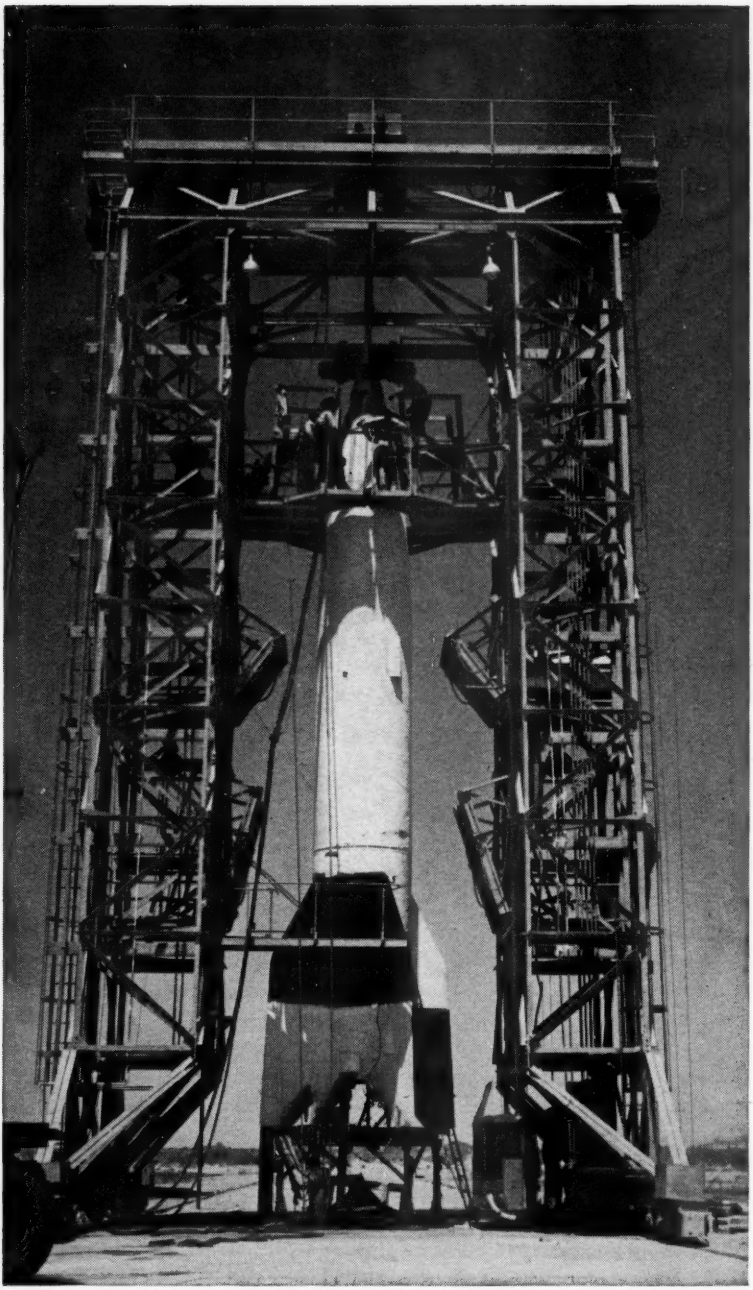
A study of the gaseous composition of the atmosphere at altitudes from twenty to sixty miles is the other major investigative project undertaken by the Signal Corps. It is known that the same gases on the earth's surface are also found in the upper levels, but considerable disagreement exists as to the relative proportion of the constituent gases at these heights. Do lighter gases predominate at higher altitudes because the heavier have diffused downward, and, if so, at what level does the "settling out" first become apparent? This question has long puzzled scientists and the Signal Corps hopes to find the answer soon.

The air sampling project also has been delegated to the University of Michigan. The method used in this research involves sending vacuum bottles aloft by rocket. At pre-determined altitudes, the containers are opened to permit the intake of air and then the bottles are sealed while still in flight. The recovered samples of captured gases are analyzed in laboratories to determine their make-up.

Steel cylindrical bottles of five hundred cubic inch capacity are used to collect the samples. To obtain a representative quantity at the desired altitude, air scoops that extend several inches from the rocket skin were devised. At a proper time during flight, the opener allows air to flow through the scoop into the bottle for about four seconds, after which a sealer automatically closes the container.

Many refinements have been made in this technique since the beginning of the tests, especially in opening and sealing the cylinders. The possibility always exists, however, that some air carried aloft in the rocket might enter the containers while they are open. To ascertain conclusively that the samples are not contaminated, a radioactive element is released in the rocket just after take-off. This element quickly permeates the interior of the rocket. If any surface air enters the bottles, the radioactive tracer is also trapped and is detected in the analysis.

Preliminary results indicate that atmospheric gases are completely mixed below about forty miles altitude. Above this level a significant increase in the concentration of the light gas, helium, has been detected with a corresponding decrease in the quantity of argon, a heavy gas.



This gantry crane mounts the V-2 on its platform and provides a catwalk from which adjustments on the warhead are made. U. S. Army Photograph

To protect complicated equipment from landing shock, instruments and containers are carefully packed and braced to prevent or minimize damage on impact. Some rockets are constructed so that the nose or tail section, or both, may be blown off on the downward leg of the flight by explosive charges. After severance, the rocket comes down in a flat spin instead of nose first. This serves to lessen the force of impact.

Although the rocket may be deliberately broken apart to ease its fall, on certain flights even greater protection is required. Some experiments, to be successful, are absolutely dependent on recovery of certain parts undamaged. On such flights, a ribbon-type nylon parachute eight or ten feet in diameter has been used to bring down the nose section holding the containers. At a prescribed time, the wall of the rocket is cut by an explosion of primacord, allowing a parachute to be pulled free as the two sections separate. If this method is attempted with too heavy a load at too high an altitude the nylon becomes hot and may burn during the descent. A new non-inflammable material is therefore being sought to replace nylon in parachutes to be used at altitudes above thirty miles.

Upper atmosphere research with rockets in the United States dates from the close of World War II. The WAC Corporal, used initially, was replaced in 1946 by the much larger German V-2. The latter was imported and used with only minor modifications except that experimental equipment was substituted for explosives in the warhead. Currently nearly all rocket studies are being conducted with American-built equipment.

The Aerobee rocket, in general use today by the Signal Corps, is capable of carrying one hundred and fifty pounds of experimental gear to an altitude of about sixty-five miles. It is accelerated at take-off by a solid propellant booster; after the thrust is expended, the booster parts from the rocket and falls to the earth. The Aerobee reaches peak altitude within two and a half minutes after take-off. Descending, the rocket again gains speed until it is blown apart and its parachute is opened. While traveling through space, the rocket undergoes considerable surface heating due to air friction and it is not uncommon to find the surface paint cracked and blistered after a flight.

To stabilize the Aerobee during take-off, a launching tower one hundred and forty feet high is used. To compensate for the winds that tend to deflect the rocket, the tower can be tilted from the vertical a maximum of six degrees. This tilt also assists in predicting the recovery site.

Locating the rocket after a firing was often a lengthy process in the early days of rocket research. However, with continued improvement of rocket tracking by radar and optical instruments, the location of the impact point and plots of the flight trajectories have improved immensely. Sound-ranging stations to detect the impact have also proved invaluable. Almost every rocket carries a small transponder beacon which transmits a return signal to a ground-based radar set. The signal "positions" the radar and gives the rocket's location throughout its flight.

Radar tracking is also used as a safety measure. If the vehicle veers off course during its powered ascent, the deviation is readily noted from the radar data. If the rocket's behavior becomes dangerously erratic, a change in signal is sent to a radio receiver within the rocket; this in turn activates an explosive charge that breaks the fuel line and terminates the flight.

Co-ordinating and assisting in the Signal Corps' efforts to explore the stratosphere is the Upper Atmosphere Rocket Research Panel composed of representatives of all Department of Defense and United States civilian agencies engaged in rocket investigations. Members of the Panel hold periodic conferences, generally at monthly intervals, to discuss mutual problems and to formulate plans for future experiments.

Research of the upper regions, although still in the pioneer stage of development, is making a significant contribution to the security of this and other free nations. Continuing advancement in rockets and research techniques promises to provide even vaster knowledge of this relatively uncharted realm of science. By expanding mankind's fund of basic knowledge, the study opens new vistas for scientific progress.

Until new weapons and new military applications of atomic energy are available for field use, our national safety in the face of attack depends upon the improved conventional weapons, in ample quantity and with sufficient trained and equipped ground, naval and air forces to use them effectively. As the developments now in progress indicate that the scientific, technical and engineering problems are being solved, the new weapons are becoming complementary to conventional weapons, and will eventually replace certain types, to the ultimate improvement of our overall defense program.

The Honorable Robert A. Lovett

ARMOR MILITARY STAKES--SPUR TO ACHIEVEMENT

L. M. KOHLMEIER

FOR more than one hundred and fifty years the horse cavalry was the specialized arm of mobile, offensive fire power of the United States Army. During the 1930's, however, the mechanization program advanced by such Army pioneers as Colonel Daniel Van Voorhis and Lieutenant Colonel Adna R. Chaffee led to replacement of cavalry by armored vehicles and tanks.

Events of 1939-40 demonstrated to the Nation and the Army the power of the Nazi Panzer divisions; accordingly in July 1940 an Armored Force, independent of any branch, was organized with General Chaffee in command. Symbolically, when this pioneer of Armor died in 1941, tanks rather than caissons rolled in his cortege to Arlington Cemetery.

Today the mobile, thrusting fire power mission belongs to Armor. Yet some of the traditions of horse cavalry days which serve the purposes of morale and function are still preserved. Famous old Cavalry units such as the 3d Cavalry Regiment and 1st Cavalry Division nominally remain, although as armored or infantry organizations. Armor's branch insignia, designed at The Armored Center at Fort Knox, consists of a tank silhouette superimposed on the old crossed sabers of the Cavalry. Another tradition of Cavalry days, the Military Stakes, has been adopted by The Armored School for its students.

The Cavalry Standard Stakes was a form of competition staged at the old Cavalry School at Fort Riley, Kansas, for twenty-five years prior to World War II. In 1947, Major General I. D. White, then Ground General School commandant, adapted it as a test for officer candidates. General White, who later refashioned the United States Constabulary in Germany from a police unit to a hard hitting, mobile armored organization, now commands The Armored Center and its Armored School. Under his sponsorship the Armor Military Stakes was instituted

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A student locates an antitank mine which he must carefully remove without detonating it. U. S. Army Photograph

A briefing by an operations officer precedes a trial run on the Armor Military Stakes Course. U. S. Army Photograph

for the first officer candidates to attend The Armored School since World War II.

Originally the Cavalry Standard Stakes was a mounted competition in which the contestant, riding a series of horses, was required to negotiate a course of jumps, run a cross-country race, complete a mounted saber course and carry a polo ball the length of a polo field. Each contestant also had to demonstrate his marksmanship with rifle and pistol and his ability at foot racing. The course was known as a "stakes" competition because each entrant paid a dollar entry fee and the running was on a winner-take-all basis.

In the Military Stakes Course which General White introduced at the Ground General School, the Cavalry tradition was maintained at one station where proficiency in horsemanship was required. Members of the officer basic and the officer candidate classes at Fort Riley competed and were scored on a basis of seven hundred points for demonstrated proficiency at all stations. An additional three hundred points was awarded if the two mile course was finished in forty-five minutes.

Today the same one thousand point scale is used in scoring the new Armor Military Stakes, with the added proviso that the contestant loses five points for each minute in excess of the "standard" running time of one hundred and five minutes. The Stakes consists of a road and cross-country foot race with twenty stations en route where basic military, tactical or proficiency type problems are encountered. The course is three miles long.

Students at The Armored School—including officer candidates and members of the Advanced Officer Course—compete in the Stakes as one of the culminating events of their training at Fort Knox. First the contestant demonstrates his knowledge of signal techniques by locating a defective wire circuit, connecting a field telephone or field wire lines, then splicing a broken conductor on the field wire. Next his proficiency with weapons is put to the test. At Station Two he assembles a submachine gun, fires ten rounds for record and disassembles the weapon. At Station Three he assembles an M1 rifle, fires ten rounds at silhouette targets one hundred and twenty-five and two hundred yards distant, and disassembles the rifle. Later at Station Four he assembles, fires and disassembles the pistol.

Problems in tactics, scouting and patrolling are encountered at Stations Five and Six. The contestant is required to solve a tactical situation by selecting a favorable attack position and designating a line of departure, the direction of main attack

and the formation to be used during the attack. He then must reconnoiter a prepared road block, select the areas to be mined and direct the deployment of a platoon securing the road block.

The gamut of field problems continues at Station Seven where the student must locate and remove two dummy anti-tank mines. At Station Eight he must solve a map reading problem; next he chooses from among three mock-ups the proper method of recovering a ditched vehicle.

At Station Ten the runner scans a battle scene, then is quizzed on his observation and awareness of intelligence data. Among other things, he must quickly decide what to do with dead enemy personnel, prisoners of war and captured enemy radio equipment. At Station Eleven he directs the deployment of security elements guarding a tank company assembly area. At Stations Twelve and Thirteen, he undergoes a test of his ability to throw hand grenades accurately; he then must adjust the track of an M4 Sherman tank to the correct tension. At Station Fourteen he is called upon to draft a terse, accurate field message in proper form, after which he prepares and places a demolition charge to fell a tree and goes on to complete a problem involving correct use of radio and telephone procedure.

At Stations Seventeen and Eighteen the contestant crawls into a tank turret to lay the main gun on a designated target, meanwhile estimating range and setting up a correct sight picture. He then fires the tank coaxial machine gun for record. At Station Nineteen the student performs quick repairs on a disabled jeep and starts the motor to prove his mechanical ability. Finally with the end in sight at Station Twenty, he must correctly identify the characteristics of various types of radio sets used in Armor. Points are awarded according to degrees of demonstrated proficiency rather than on an all-or-none basis.

The four departments of The Armored School—Command and Staff, Automotive, Weapons, and Communications—initially planned the problems and situations. They also provide the instructional personnel who rate the students' performance at the various stations.

Besides introducing a spirit of zestful competition into training, the Armor Military Stakes serves the dual purpose of testing physical stamina and military proficiency. At the same time, it perpetuates one of the Cavalry traditions as a reminder of that branch's record of achievement and as an inspiration for future accomplishment.

WHAT'S NEW IN VAPOR BARRIER CLOTHING

MICHAEL SLAUTA

A SUIT that "buttons" right to the skin is the latest innovation in the Quartermaster Corps' never ceasing campaign to provide better cold weather clothing for American soldiers. The new vapor barrier suit was tested in Korea last winter and at Exercise Snowfall at Camp Drum, New York. Experts are currently evaluating results of the tests.

Made of impermeable plastic, the sponge-like material contains millions of microscopic air cells which provide insulation and even enough buoyancy to float a man easily. And while the suit does not actually button to the skin, its knobby inner surface consists of hundreds of small button-like projections which hug the body with polka dot regularity. The intervening space forms a layer of dead air which conserves body heat and thus vaporizes any moisture which may get under the suit.

Previously the Quartermaster Corps had developed winter clothing on the layering principle, with successive layers of light-weight cloth enclosing dead air space for insulation. But this new soft rubbery material (which can be stamped out rather than tailored) provides its own built-in air spaces. What is more, a suit weighing only about five pounds will float a man carrying forty or fifty pounds of equipment.

In the continuing search for substitute insulating materials which may offer improvements over conventional fabrics, a team of scientists and cold weather consultants—including Dr. Paul A. Siple, who accompanied Admiral Richard E. Byrd on Antarctic expeditions, and Sir Hubert Wilkins, British explorer—have been evaluating the new apparel.

One cold weather scientist tested the suit by sleeping outside in a lean-to shelter, in temperatures averaging 35° Fahrenheit, with no other covering than field jacket and trousers. These were worn only to prevent abrasive damage to the comparatively

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soft material, not for additional warmth. The researcher experienced no sensation of cold except, oddly enough, in the finger tips. This probably was caused by the suit binding some surface of the body. Further experiments will probably solve this simple tailoring problem and may also develop a harder, tougher plastic material. The writer personally has worn the suit without discomfort while active in the cold chamber of the Quartermaster Climatic Research Laboratory where temperatures were 40° or more below zero.

A six-man team toured the Korean battle areas last winter to check on capabilities of the suit, taking dips in the Han River to determine the flotation and survival characteristics of the plastic outfit. Previously members of the Environmental Protection Branch of the Quartermaster Research and Development Division had tested it by leaping into the Pentagon Lagoon. When they climbed out the button-like knobs on the interior allowed the water to drain off quickly. A brisk walk on shore helped to warm up the remaining moisture, vaporizing it and eventually drying out the suit completely.

The new type of vapor barrier clothing is designed to secure adequate body protection within the so-called wet-cold range—mean monthly temperatures from 14° to 68° Fahrenheit. Later studies will concentrate on protection in dry-cold temperatures, which are much below that of the wet-cold range.

Earlier, the Quartermaster-developed insulated boot, now being worn in Korea, had employed much of the same principles. The heat conserving and insulating qualities of the boot depend largely on dead air space rather than on thickness of fabric. Effectiveness of the new type boots was investigated by the same team that tested the suits in Korea.

Astonishingly few faults were discovered in the first experimental vapor barrier suit that was tested. Several more were made by Quartermaster tailors, each one incorporating improvements such as new systems for forming seams, re-inforcing joints and so on. The plastic substance, molded from non-critical materials, is easily manufactured in bulk and worked into garments at one tenth the cost of ordinary clothing.

Entirely new fields in the important science of body protection are opened by the plastic suit. Further tests are under way to insure that American troops are furnished with the best types of clothing—apparel which will enable them to carry the war to the enemy, unhindered by bone-chilling cold which saps efficiency in wet-cold battle zones.

POSTGRADUATE SCHOOL OF THE NAVY

REAR ADMIRAL E. E. HERRMANN

AS NAVAL science and technology have advanced, so too the United States Naval Postgraduate School has consistently moved ahead on two interrelated fronts. One front involves the training of naval and other officers to keep pace with advances in techniques—a "must" if we are to realize the maximum in national defense from our scientific research and development. The other involves motivating these same officers to push still further forward in scientific studies and outlook so that ultimately even greater technical advances may result.

In recent years the School outgrew its old physical plant at Annapolis, Maryland, and early this year it moved to more spacious facilities at Monterey, California. There it is continuing on an expanding basis the advanced education of officers.

Since its founding in 1909, the School's development has continually paralleled the Navy's growing interest in science and technology until today the advanced instruction and training are tailor-made to fit the Navy's specialized needs. The School functions as the headquarters and nerve center of the Navy's advanced education for officers. Under it is established the Engineering School for the technical curricula formerly conducted at Annapolis. The existing General Line School at Monterey and the Naval Intelligence School at Anacostia, District of Columbia, are other components of the Naval Postgraduate School. Thus the move to Monterey consolidated in one place all the schools except the Naval Intelligence School.

The mission of the Naval Postgraduate School is to conduct and direct the advanced instruction of commissioned naval officers as required to meet the needs of the Navy. The institution is unique among service schools in that, under a 1947 Act of Congress, it is empowered to award bachelor's, master's and doctor's degrees.

REAR ADMIRAL E. E. HERRMANN, USN, is Superintendent, United States Naval Postgraduate School.

By a large part of the American public, a naval officer is considered fully educated when he graduates from the United States Naval Academy or when he comes into the Navy after acquiring an education in a civilian school. But to the Navy that is just the begining of a continuing education. The Naval Postgraduate School, through its General Line School, gives courses of instruction to fill gaps in the naval education and experience of junior officers, and through its Engineering School gives technological courses, many leading to advanced degrees. It also sponsors the further education of outstanding students to the doctorate level at civilian institutions. The Naval War College, the National War College and the Industrial College of the Armed Forces provide higher professional education.

Three paramount considerations make it essential for the Navy to continue expanding its advanced instruction and training of officers. First, of course, is the advance of science and technology—an advance which is reflected in increasingly complex equipment of naval vessels. A modern destroyer, for example, contains more complicated equipment than a cruiser back in 1925 when radar was only a scientist's dream. Second, as demonstrated by World War II, the conduct of modern total war requires that within the military there must be at least a cadre of officers with higher technical education who can provide the liaison which is essential if the fruits of research are to be promptly and effectively applied to military problems. Third, while most officers need not be specialists, still it is essential that they be professionally competent, well rounded in basic knowledge and up to date in current technical developments. Thus the education of a successful officer is an ever continuing need and should include periodic return to appropriate service schools.

Postgraduate instruction of naval officers is conducted at Monterey, at Anacostia and at outstanding civilian institutions. The service schools teach those subjects peculiarly fitted to the Navy, while the civilian schools provide instruction in subjects for which it is impractical or uneconomical to provide comparable facilities at the Naval Postgraduate School.

At present there are four hundred and thirty-two student officers enrolled in the Engineering School, including sixty-four Marine Corps, twenty-two Army, twenty-eight Coast Guard, one Public Health Service and seventeen foreign officers. Also under the School's administration and close supervision, there are an additional four hundred and fifty-three student officers pursuing

advanced study at various civilian colleges and universities.

The Engineering School is administered by a Director, under the Superintendent, with a naval staff of twenty-three officers and a civilian faculty of seventy. Through continual liaison with sponsoring bureaus and offices of the Navy Department, the naval staff insures that curricula are kept abreast of requirements. The naval staff also performs administrative duties and "Dean of Men" functions. The civilian faculty, headed by an Academic Dean, presents the various scientific courses, both basic and advanced. The naval staff provides a small number of instructors for the few strictly naval subjects which are taught at the School.

Most of the individual courses are at graduate level and it is often possible for a student officer to qualify for a graduate degree. Although the attainment of a degree is secondary to the objectives of the School's various curricula, student officers are encouraged to work toward this goal when possible. This gives added incentive and assists in maintaining a high academic level of study and instruction. Normally the attainment of a master's degree under the Naval Postgraduate School's auspices requires two or three years.

Buildings in the foreground house the School, while those in the rear serve as temporary laboratories. U. S. Navy Photograph

A major function of the Engineering School is the education of well-qualified specialists as required by the technical bureaus of the Navy. Quotas for such specialists are established by the Bureau of Naval Personnel. Curricula designed to produce the desired qualifications are worked out by the Naval Postgraduate School in liaison with the sponsoring bureaus or offices. Thus the needs of the Navy are met on a made-to-order basis.

Some curricula are given entirely at the Naval Postgraduate School, some entirely at civilian schools, while others are given in part at both. Because engineering specialties are in greatest demand within the Navy, the School has developed a strong faculty and well-balanced curricula in electronics, aeronautical, electrical, naval and ordnance engineering, operations analysis, radiological defense, communications and aerology. Completion of most of these curricula requires either two or three years. The final year for some—notably radiological defense and specialized ordnance engineering courses—is at civilian institutions.

The Naval Postgraduate School staff makes all arrangements with civilian schools best qualified to cover the desired curricula. Officer students are enrolled; regular checks are made on the scope and adequacy of instruction and the necessary records are maintained at the School.

The General Line School offers students a one-year professional curriculum which has been specially designed to round out the naval background of junior officers. Under the Superintendent of the Naval Postgraduate School, the General Line School is a separate entity, headed by a Director, and with a naval staff of fifty-one and a civilian faculty of twelve. The student body totals five hundred and sixty this year and is expected to grow to more than one thousand. Courses are given in mathematics, electrical and electronics engineering, navigation, military law, international law, ordnance and gunnery, seamanship, logistics, leadership and administration, strategy and tactics, anti-submarine warfare, aerology, damage control, foreign relations and intelligence, naval engineering, radiological defense, communications, aviation and submarines.

At present the student body comprises officers commissioned from sources *other than* the Naval Academy or Naval Reserve Officer Training Course colleges—officers who have transferred to the regular Navy from former reserve or temporary status. However, with expanded facilities at Monterey in sight, plans are being pushed that will require all junior line officers to take this year of education about five to seven years after being com-

missioned. Selected graduates of the General Line School will then be assigned to attend the Engineering School, or the Armed Forces Staff College, or junior courses at the Industrial College of the Armed Forces or the Naval War College.

The Naval Intelligence School at Anacostia is concerned with training officers for intelligence and related duties. It also teaches foreign languages in which the Navy desires to qualify interpreters. Although under the direction of the Superintendent of the Naval Postgraduate School, supervision of curricula here is exercised largely by the Division of Naval Intelligence in the Office of the Chief of Naval Operations.

Determined efforts to provide education beyond the undergraduate level had begun a decade before the founding of the Naval Postgraduate School. Rear Admiral George W. Melville, then Engineer in Chief of the Navy, was a leader of the move in 1899. Later, in 1907, Rear Admiral Charles W. Rae, Engineer in Chief, re-emphasized this need and reported that favorable results had been obtained from an engineering class conducted in the Bureau of Engineering in 1904 .

The School was originally established as a department of the United States Naval Academy in 1909 and occupied space in one of the Academy's buildings. In 1919 larger quarters were provided by shifting into a former Marine barracks on the Academy grounds. As far back as 1944, however, it became apparent that larger physical facilities would be needed. In 1947 the Congress established the Naval Postgraduate School as a separate entity, and at the same time plans and legislation were initiated to provide suitable facilities for the School at Monterey. Although facilities at the new location were not yet complete, the move was undertaken in November 1951 because of overcrowding and inadequacy of space at Annapolis. The full fruition of plans for expanding the School's facilities and extending its educational scope will therefore probably not be apparent for another year or two.

At present both the Engineering School and the General Line School are occupying interim accommodations in and near the former Hotel Del Monte, at Monterey, California. Steam engineering and ordnance and gunnery laboratories will eventually be developed on a fifty-eight acre beach tract adjoining the main location. Wind tunnel and aeronautical propulsion laboratories will be built on an outlying one hundred acre parcel near an airfield operated jointly by the Monterey Airport Authority and the Naval Auxiliary Air Station. This air station

provides facilities for maintaining flight proficiency by the approximately five hundred naval aviators attached to or attending the Naval Postgraduate School. The School property also includes a tract on which a one hundred and thirty-five unit Wherry Housing project is now nearing completion and an additional project is about to be started.

The first increment of permanent construction will include a five-story structure providing space for the Departments of Electronics and Physics, Chemistry and Metallurgy, and most of Aerology; a two-story building for the laboratories of the Department of Electrical Engineering; classrooms and drafting rooms for the Engineering School and some of its departmental offices; and a new heating plant. The second increment will include a three-story building to house the Departments of Aeronautical Engineering and Mechanical Engineering; and a twelve hundred seat lecture hall. Future additions will include buildings for the General Line School, a library, permanent buildings for steam engineering, ordnance and gunnery, wind-tunnel and aeronautical propulsion laboratories, and an infirmary, barracks, and mess hall for enlisted complement, gymnasium, auditorium and chapel. The entire building program will take at least five years to complete.

The formative years of the Naval Postgraduate School were crucial ones during which our Navy was feeling the impact of the very technology which it had itself done so much to foster in the industrial world. The steel and electrical industries, for example, acknowledge that much of their early progress resulted from Navy demands. This process has continued ever since and today the Navy is a leading factor in applying electronics, to name just one field of endeavor, to all manner of military uses which, in turn, inspire a host of non-military applications.

At present the Navy also is playing a prominent role in applications of nuclear power—applications which will certainly have direct and far-reaching consequences in peacetime pursuits. It behooves us, then, to be mindful of the necessity for keeping our educational efforts in pace with our efforts to exploit fully the vast potentialities of science and technology. We must never give second priority to the development of the brains required to design and use competently the products of our generously supported research and development programs.

THE DEVELOPMENT OF ARMY MAPPING

COLONEL J. G. LADD

EVER since the United States Army was founded, the importance of military mapping has been recognized by Army tacticians. The first commander-in-chief, General George Washington, was himself one of the eminent topographers of the day; and the United States Military Academy largely owes its origin to the demand for skilled engineers and map makers.

The need for a dependable military mapping service became apparent during the War of 1812. The following year a Corps of Topographical Engineers was established with an original staff of eight officers. Between field assignments, these officers served as faculty members at the Academy. This soon proved to be an unsatisfactory arrangement, for when work assignments were heavy it was necessary for these officers to withdraw from instructional duties. At one time, only one instructor was left at the Academy. Soon afterward the two functions of the Corps were divorced. Topographers devoted themselves to the mapping and navigational work while the Academy trained its students for general military engineering duties.

Never a large organization, the Corps of Topographical Engineers reached its peak strength in 1861 when it had forty-eight officers on the rolls. The roster of this highly technical unit contained the names of many who occupied positions of high military responsibility during the Mexican and Civil Wars, among them Generals McClellan, Meade, Fremont, Johnson.

Prior to the Civil War, the Corps of Topographical Engineers controlled all Federal civil works for navigation of harbors and internal waterways while the Corps of Engineers confined itself to the construction of coastal fortifications.

The interdependence between topography and field engineering came into sharp focus during the Civil War and led to the

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consolidation of the topographic and fortification branches of military engineering. In 1863 the Corps of Topographical Engineers was disbanded as such and merged with the Corps of Engineers. Since then all phases of military engineering have been under direct supervision of the Chief of Engineers.

In 1917 the Corps of Engineers created a Central Map Reproduction Plant to fulfill anticipated demands for military maps. The plant turned out comparatively few maps for the American Expeditionary Forces since topographic units in France were able to meet most of the mapping requirements incidental to static trench warfare. Shortly after World War I the Central Map Reproduction Plant absorbed two other units, the Central Photographic Laboratory and the Engineer School Press, and the activity became the Engineer Reproduction Plant.

In 1940 the entire Army map making staff consisted of less than one hundred persons housed in a converted two-story barracks building. At that time, virtually all personnel employed in the production of maps were expert cartographers, skilled in all phases of map making. With the approach of World War II the necessity for having huge supplies of maps in readiness was evident, but qualified cartographers to produce this increased volume of work were not available. Consequently the assembly line production method, borrowed from civilian industry, was tried for the first time in map making. Relatively untrained men and women were quickly taught to execute competently one or more of the basic steps in map making. This system helped insure an adequate supply of maps for World War II.

Between 1919 and 1940 the Engineer Reproduction Plant was engaged exclusively in domestic mapping. During those years it was possible to make occasional studies and experiments with cartographic and photolithographic processes and media, resulting in many improvements. Intensive research led to the discovery of many of the techniques which contributed greatly to eventual map production in unprecedented quantities.

Indicating how the need for military maps has grown, some five hundred million maps were produced by Army Map Service during World War II as compared with only nine million required for World War I operations. In all, during World War II, Army Map Service turned out forty thousand different maps for a total of 491,000,000 sheets. If piled in one stack this work would tower two hundred and ninety-seven times higher than the Washington Monument. The Battle of Normandy alone re-

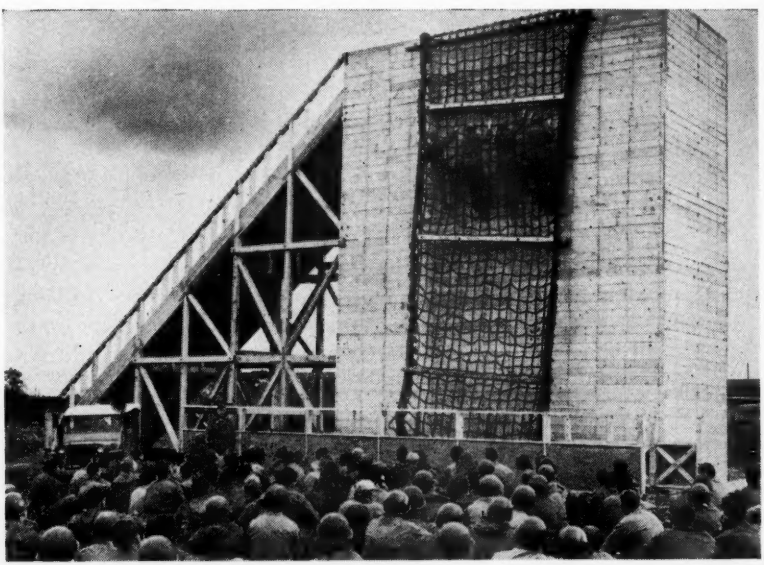
quired seventy million sheets of three thousand different maps. An advance printing of six thousand tons of maps were needed to plan and execute the initial landings alone.

The prodigious map making requirements of this era of global warfare are reflected in the fact that today over three thousand people are employed by Army Map Service. Twelve buildings covering approximately 750,000 square feet of floor space are required for the operation. The Army Map Service base plant, located in Maryland just outside the District of Columbia, is one of the most modern map making installations ever constructed. The Service also has five field offices located in Louisville, Kentucky; Kansas City, Missouri; Providence, Rhode Island; Cincinnati, Ohio; and Fort Sam Houston, Texas. A five-story map storage building capable of handling over forty million maps is located in the Nation's capital and a safe depository building is maintained in Nebraska.

Recently Army Map Service completed the first and most important phase of one of the most extensive map revision programs ever undertaken in cartographic history—the conversion of existing World War II military grids to the recently adopted Universal Transverse Mercator (UTM) grid. Use of the UTM grid in common with other allied nations is of vital military benefit, from both a security and simplification aspect, making possible co-ordinated military effort with allied armed forces.

Although the Army Map Service can now print over one million maps in an average week, it was physically impossible to reproduce all of the maps in this far reaching grid conversion program and at the same time keep up with normal map reproduction commitments. Some forty lithographic firms were engaged on a contractual basis to aid in the reproduction of UTM converted maps. Map making agencies of allied nations also co-operated. More than seventy-five million maps were printed with a total of over two hundred and fifty million press impressions. During 1951 alone, the total number of maps produced for this UTM grid conversion program was even larger than the number prepared for the cross-channel invasion of France, which in turn was the greatest single mapping program of World War II. Such is the expanding scope of Army Map Service operations as it keeps pace with, and even anticipates, our world-wide defense requirements.

Thunderbird troops advance up a beach during amphibious exercises held off the Japanese coast. U. S. Army Photograph



Soldiers of the 45th Division get a practical demonstration of the proper method used in climbing a ship's landing net. U. S. Army Photograph

THUNDERBIRDS ON HOKKAIDO

LIEUTENANT PENDLETON WOODS

AS THE gray troop carriers of the Military Sea Transportation Service bore the soldiers of the 45th Infantry Division through the calm waters of the North Pacific in April 1951, wondering eyes gazed intently at the rugged, bare mountains along the coast of Hokkaido, northernmost of the major islands which make up Japan. To most of the men the moon could not have been a stranger place. Relatively few had ever heard of Hokkaido before the rumors began circulating back at Camp Polk, Louisiana, that they—the Thunderbirds—might be going to that Far Eastern station.

En route, unit commanders and Information and Education officers had helped dispel some of the mystery through orientation conferences aboard ship. Pocket-size pamphlets prepared by the Army and distributed after sailing provided additonal information. From these they learned that Hokkaido is a sparsely populated island of thirty-five thousand square miles, that much of the mountainous interior is uncharted, that its winters are severe with snow often reaching to depths of eight feet, and that it is the home of the aboriginal Ainus.

Many were uncertain what their mission was to be. True, newspaper accounts in the States had quoted Department of the Army as saying troops were being sent to Hokkaido "to bolster defenses of Japan's most northern island, and to continue training." Yet many of the troops were certain that their destination actually was Korea. But here they were—moving into the natural harbor at Muroran as jet planes roared a welcome.

Most ships had to wait in the harbor twenty-four hours before the troops could be unloaded. Then "we hit the ground running," said Major General James C. Styron, Commanding General of the Oklahoma National Guard unit which was ordered to active military service in September 1950.

FIRST LIEUTENANT PENDLETON WOODS, Infantry, is Public Information Officer, 45th Infantry Division.

American troops had been on Hokkaido before. But beautiful little Camp Crawford on the outskirts of Sapporo, the island's capital, was large enough to accommodate only one regimental combat team and the division headquarters. The remainder of the 45th went under canvas to begin a period of outdoor living that has since been seldom interrupted. Even in late April the weather was still cold and the stoveless tents presented a drab contrast to tropical Panama through which the soldiers had passed less than a month earlier.

Training which began in Louisiana in the fall of 1950 was immediately resumed. The first two or three weeks were devoted to physical conditioning to remove "kinks" that had developed during the long voyage from New Orleans. Sandwiched in between strenuous exercises and road marches were reviews and tests of lessons learned in seven months of Stateside training.

Later, the line companies moved out of their squad tents and brick barracks into the hills to live in pup tents. While the riflemen were undergoing training at the squad and platoon levels, the tank, mortar and headquarters units of the infantry regiments moved into tents.

Weeks passed and training and proficiency progressed hand in hand. Field problems were made more complicated; larger units were involved in each new phase to provide practical experience in teamwork among all echelons and all arms. Company problems were followed by battalion exercises which, in turn, were succeeded by regimental maneuvers.

For a two week period the troops bivouacked at Shimanatsu Range No. 2 where they engaged in weapons firing problems and field exercises. Here they encountered tough hill country and deep ravines matted with almost impenetrable bamboo thickets. The next two weeks were spent in the Chitose area, notable for its ants, underbrush and soil of soft volcanic ash. From there they moved to differing terrain for still more training.

Training was as real as Aggressor, the Army's make-believe maneuver enemy, could plan it. During regimental problems, an Aggressor company usually served as the opponent. For exercises in which the entire division participated, Aggressor forces in battalion strength re-created many of the techniques and tactics employed by the enemy in Korea. Every trick and device was used to give the Thunderbirds a difficult time.

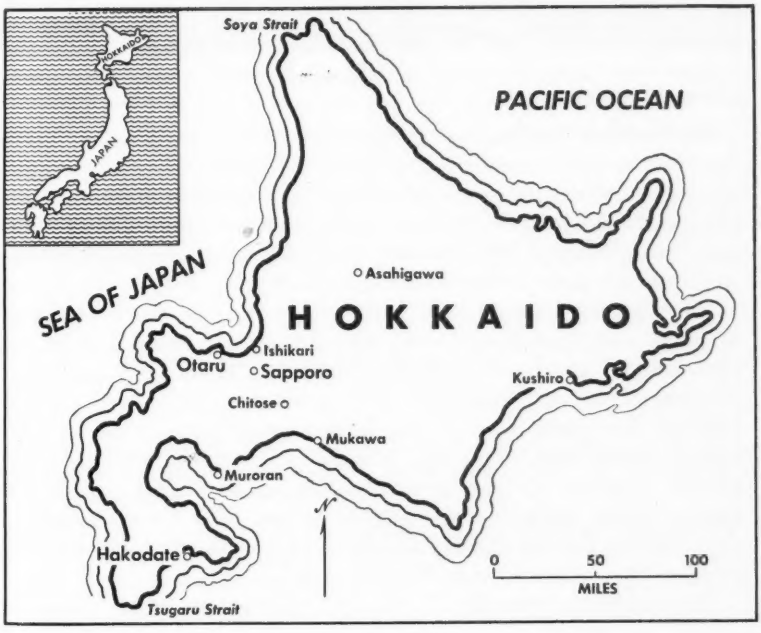
Umpire teams were spotted at all unit levels to judge the various actions. Artillery units followed directly behind the regiments to provide support. As the infantry moved up or back,

the ever-present artillerymen hitched their howitzers to trucks and went along.

Engineer units improved or built roads and bridges; they removed obstacles and laid mines or cleared them as the situation required. Roadblocks were constructed, fortifications dug out of the hillsides, positions were camouflaged—all in deadly serious preparation for the real thing.

Signal units strung communication lines almost from one end of the Ishikari Plain to the other. Light planes and helicopters augmented the communications network of radiomen and messengers on foot and in jeeps. Supply and Quartermaster trucks shuttled from railheads and supply points at Camp Crawford and Chitose, bringing the ammunition, rations, water and petroleum products required to sustain troops in the field. Army post offices received and dispatched mail regularly; field exchanges were set up to provide necessities and simple luxuries; and shower and laundry units played their part in providing a modicum of comfort in the field.

By day and night, the roar of Army vehicles reverberated through the streets of Sapporo and outlying towns and villages.



Pup tents often were to be seen practically in the yards of Japanese suburban and rural dwellers as companies spread out into squad and platoon areas. This training tempo reached its peak with an all-out division maneuver in which every available man of the 45th took part.

Soldiers of a 75-mm. recoilless rifle squad prepare to execute firing orders received via walkie talkie radio. U. S. Army Photograph

Thereafter, training on Hokkaido became more specialized. Between trips to the firing ranges to improve their marksmanship, Thunderbirds took to the sky to learn the intricacies of air transportability. Vehicles and supplies were loaded into huge Air Force Flying Boxcars and combat-geared ground soldiers were given a taste of movement by air.

Back at the home bases, troops were put to work building huge wooden "mock-ups" over which rope nets were draped for exercises in amphibious landings. By the time each man had clambered up and down the nets often enough to feel sure of himself, the stage was set for actual amphibious landings. In co-ordination with Navy and Marine Corps staffs, 45th Division officers handled the precision loading of men and equipment aboard Navy troop assault ships at Otaru. The vessels sailed to the opposite side of the island; there men of the 45th landed and stormed the beaches near Mukawa village.

The training exercise—a six-day operation from shore to

shore—was replete with tank and infantry assaults aided by naval gunfire and close-in air support. Actual and simulated evacuation of the wounded was carried out by beach medical stations, helicopter rescue teams and a hospital ship.

Training on Hokkaido continued at a strenuous pace until virtually the day of departure for Korea. Even after the Division had been secretly alerted for the movement to the combat area there was no let-up. A two-foot snowfall was seized upon to give battalion combat teams a final indoctrination in field operations under cold weather conditions. Troops had an opportunity to test their clothing and equipment and to adjust themselves to combat in sub-freezing temperatures. From snow-covered foxholes, without benefit of bunkers, Thunderbirds fired live ammunition into hills where an imaginary enemy was entrenched. This training paid dividends in Korea.

Already operating at full combat efficiency, the Division experienced relatively little dislocation upon being committed to combat. Service company drivers found nothing unusual in trucking supplies and equipment hundreds of miles weekly in support of the front-line companies—they had been doing just that for months. Mess sergeants were already well versed in the details of preparing meals in the field and sending hot food forward under cover of darkness. Company clerks had learned long before to prepare morning reports by the faint glow of candlelight. And the rifleman from his well dug-in position was picking off with deadly accuracy the Communist enemy who only weeks earlier had been merely a half-hidden silhouette target on a Hokkaido hillside.

In its progress from Oklahoma to Louisiana to Hokkaido and finally to Korea, the 45th Division reaffirms by experience the soldier's maxim—that confidence is engendered by intensive realistic training in preparation for combat.

The spirit of leadership appears in all walks of life, but most of all in the career of arms, because there the strain, the risk and the responsibility are higher than anywhere else.

Cyril Falls, Chichele Professor of the History of War, Oxford University

RED CHINA'S FIGHTING HORDES

LIEUTENANT COLONEL ROBERT B. RIGG

VI—The PLA—Past and Future

WHO would have predicted in 1945 that within four years the ragged and route-order forces of the Caves of Yenan would be governing China? Today the People's Liberation Army (PLA), an out-of-date juggernaut yet militarily effective, stands dominant over the armies of all Asia. As a national army, it is only a few years old. We know it has weaknesses, that it is in a state of organizational transition; yet it has a record of ostensibly great achievement within the compass of a few years. From a poverty-stricken military conglomeration of guerrillas it rose to conquer a larger and better equipped enemy army between 1945 and 1949.

It was the conquest of Manchuria and the defeat of the Nationalists that vaulted the Chinese Communist Army into power.

This is the last of six articles condensed from Red China's Fighting Hordes, *by Lieutenant Colonel Robert B. Rigg; 350 pages, $3.75. Copyright 1951 by The Military Service Publishing Company, Harrisburg, Pennsylvania.* *This article may not be reprinted, as a whole or in part, without permission of the publishers. The opinions expressed are those of the author and do not necessarily represent official views of the Department of Defense or any of its agencies.*

The Communists won Manchuria because of many factors. They must be given credit for their organizational ability which whipped together the apathetic and leaderless Manchurian people. Northeast China, as it emerged from the chaos of Soviet occupation, was crying for leadership; and the region, so long under the tramp of foreign boots, had none to offer from its own population. The simple fact is that the Chinese Reds supplied the leadership; and the leaders, for all their brutality and other shortcomings, led or drove the people. The Nationalists, in spite of all of their efforts, did not implement their strategy with any great leadership or political appeal. They even lacked an announced policy toward the significant Mongol and Korean minorities.

Elsewhere in China the pattern was much the same. Everywhere the Reds capitalized on Nationalist military mistakes. The Reds did not need any real strategy; they just let the Blues apply their own. The Reds then nibbled, cut away, and isolated their enemy, not by the application of any real strategy but by tactics well conceived and well carried out. By multiplying minor successes, the Reds began to gain a slight strategic edge.

Moats and trenches came to signify government-held cities and railway bridges. The pattern began to appear all over China as these giant trenches slowly ringed the cities. Woven about the moats were systems of barbed wire, abatis and pillboxes. How many new pillboxes were constructed no one knows, but they numbered in the thousands. Not only did all of these fixed defenses give a false sense of security to government troops; they bred an ill-fated "pillbox psychology" among them.

During the entire war the government armies consistently failed to trap and annihilate sizable bodies of Communists. Too often they failed to pursue aggressively when the Communists retreated. As the war progressed, the government officers failed to realize that mobile reserves, not fixed defenses, offered the best chance of military survival, if not victory.

As military aggressiveness grew on the Red side, a defensive sluggishness took root on the Blue side. The side of numerical and technical superiority grew morally weaker; the "have-nots" strengthened their spirit and hopes. The Blues developed their buttocks while the Reds strengthened their legs.

If we examine the reasons why the Reds won and the Nationalists lost, we cannot rate corruption as high among the reasons as we can rate some other factors. The effect of money "squeezed" out of military payrolls cannot compare with the effect of

China's monetary inflation on the troops. Inflation caused wide fluctuation in a soldier's pay—one month it would be worth a dollar in United States currency and the next month twenty cents. If he did not get his pay at all, it might have been due to corruption; but the soldiers did not go consistently without their pay, however small. When they lacked food, or decent food, which they often did, it was because the currency would not buy as much rice as it once did, rather than because of a light-fingered quartermaster or commander. Six months of inflation had a more devastating influence on Nationalist troop morale than did one year of corruption among the military.

No, the reasons for Communist victory, if they could be found in the realm of non-military factors, lay beyond corruption within the Nationalist ranks. Corruption existed, but as a cause of military victory or defeat it was only secondary at best. What then, were the other causes?

Nationalist troops were already tired of war in 1945, and with just reason. The absence of rotation or any actual personnel policy discouraged them. There was no real hope of discharge except by death or wounds. The pay was low, so the soldiers stole from the farmers in order to have an occasional decent meal. The men resented the comparatively luxurious living of the higher officers. Above all, inflation and potential death destroyed their hope. Thus the soldier, the one essential weapon of battle, was neglected by the Nationalists. Surrender and desertion became more common as the war neared its climax.

What were the Communists doing during this period that could give them a combat edge? The Reds caught the backwash of inflation, but they guarded their soldiers from its impact. Noticing that even their currency trailed to some extent the spiraling of inflated Nationalist dollars, the Reds were clever enough not to pay their troops in cash that might show a visible depreciation. Red army units bought the food and small luxuries and issued them to the troops. There were usually sufficient supplies to give the Communist soldiers a feeling of consistent support. They did not know that their unit funds were often inadequate, that even in Red territory certain prices doubled; they simply saw consistency of food under most conditions (except certain days of combat) and they gained the impression that their leaders had a firm hold on the situation.

The Communists kept attacking and kept their troops moving. Above all they kept their soldiers away from the towns and cities where money could have been spent if it had been avail-

able. Nationalist soldiers, on the other hand, lived in or passed through the populated centers where money could buy delicacies and pleasures. Thus the government trooper came to contrast his position with the wealth he saw in the cities, while the Red soldier saw small contrast between his status and that of the farmers and villagers where wealth was little in evidence. Each environment had its own impact on soldier morale.

But the war was influenced by other factors as well. The absence of a proper logistical concept was inherent in too many of Chiang's generals. As the armies grew to unwieldy size, it became more important that planning should be on a logistical, not merely tactical, plane.

Logistical problems on the Communist side were never this complex because their forces were trimmed down to effective combat units. The Reds were careful to maintain in any locality only the number of troops they could adequately support there. Like the civil war in Russia, the Chinese conflict ranged largely around rail lines. The Chinese Communists showed great ability in destroying these ribbons of communication. They not only blew up the bridges and burned the ties, they also carried away the rails—and in places obliterated all traces of rights-of-way.

As the government armies showed less and less ability to stem the Red tide, they often found their elements floundering in tactical isolation as a result of Communist encirclement. The Chinese Air Force, which had had so little effect on the Civil War, was called upon to make an increasing number of air drops to beleaguered units. This is a difficult and costly technique. The Chinese never mastered air drops. I have stood inside Communist lines and watched Red soldiers cheer Nationalist parachute drops, then open up the supplies intended for Nationalist troops several thousand yards distant.

In final analysis, the Nationalist Army became an unwieldy instrument of the government. The Army was so large and so dispersed that it could not be successfully supplied, administered or maintained for effective combat by the staffs that existed. The Nationalist Army was burdened with excessive overhead in personnel; too many of its commanders, and even staffs, lacked an adequate understanding of the importance of logistics in war.

The Soviets Arrive

Within four weeks after the signing of the Sino-Soviet Pact on 14 February 1950, over three thousand Russian officers and advisers were unpacking their cheap suitcases in the hotels of

Mukden, Peking, Shanghai and other Chinese cities. Here was implementation! The United States, which had about three thousand officers and men in its Military Advisory Group (MAGIC), never implemented a training mission or a military pact as rapidly.

Imagination is being demonstrated by the Soviet officers who are training and helping to reorganize the PLA today. These Soviet officers, professionals at combat, are giving the needed injection of modernism to the PLA and are getting to the roots of the problems that exist. Chinese divisions are being reorganized along Soviet lines; weapons new to the Chinese are being supplied or are scheduled for future delivery, and Chinese soldiers are being schooled in their use. Artillery techniques are especially emphasized. The Soviets are endeavoring to correct the imbalance of the PLA and to bring the armed forces qualitatively up to a modern level.

The Soviet influence is already evident in the Red Chinese Air Force which is growing rapidly. Now the Soviets are apparently restraining its combat action so that when it does fight, it will do so in strength and yet with a measure of combat know-how.

The question arose in 1951 as to why the Chinese forces in Korea had not been equipped with the Soviet arms and equipment that were common to the Red Korean Army in 1950. There is no mystery about it. Between the signing of the Sino-Soviet Pact and the launching of Chinese aggression in Korea, less than a year elapsed. Soviet tanks, artillery pieces and such must travel the lengthy Trans-Siberian Railway to reach China. It has required time to get any substantial tonnage of the heavier weapons into the PLA's hands and additional time to train the Chinese in their use. The Soviets have not wanted to see Russian arms and equipment thrown away because of improper use. Artillery divisions cannot be organized and trained overnight.

The Soviet Military Mission to Red China must be visualized in terms of what a similar Russian mission did in North Korea. The Soviet advisers did not take long (just over a year) to shape the North Korean Army into an effective satellite military force. In 1950 the North Korean Army shouted "Banzai" and charged with utter recklessness into attack; but it was fronted by well-manned Soviet tanks and backed up by Soviet-trained artillerists. The Red Koreans did not attack as a horde of ill-armed orientals but as a force as modern, in general organization and arms, as the Soviet satellite army of Czechoslovakia. The Red Koreans attacked using the most modern European tactics. Their

armor daringly led them forward and hesitated at nothing. In June 1950 the North Koreans had a *modern* military force, even though it lacked a few refinements.

Until September 1951 the PLA had not demonstrated any real up-to-date quality, organizationally or tactically. The PLA lacked the dash of the 1950 Red Koreans and did not have a modern trick in its tactical or strategic bag. But this will change —not suddenly, but steadily under Soviet tutelage. The Chinese and their Soviet advisers are studying lessons learned in Korea.

Can the PLA Invade Taiwan?

The Red Army of China has other missions than the Korean. There is Taiwan (Formosa) which it promises to invade. How successful will it be in this venture?

Red officers have been worried over their chances of success in the proposed invasion of Taiwan. However, to compensate for the PLA's lack of amphibious excellence, the officers are planning a giant operation wherein sheer numbers and volume are expected to insure success.

The Korean War was not the only deterrent to the Red invasion of Taiwan. The Chinese Communists discovered, after a few trials, that their amphibious techniques were uncertain and clearly unmodern. This gave pause to a portion of their plans for invasion. There were, however, larger factors in the postponement—the interposition of the U. S. Seventh Fleet and the need that developed (as judged by the Sino-Soviet conference which reportedly took place in Peking in August 1950) to move PLA troops to Manchuria and subsequently into Korea. But the initial pause resulted from the Red discovery that they lacked proficiency in amphibious operations. The PLA is still training in this type of specialized operation but none of its elements are skilled in it. Publicly the Communists claim mastery of amphibious warfare; inwardly they know they are weak.

The PLA's "Plan to Liberate Asia"

Some may be unwilling to give credence to fact but the PLA does plan to conquer Asia from Japan to India. It may be argued that the Chinese cannot accomplish that objective. The answer, of course, lies in the future; but there are indications that the Chinese Communists will try to carry out this ambitious plan.

Whether or not the United Nations' military forces accomplish some form of final defeat of the Chinese and the North Korean Red Armies in Korea—or at least slow that aggression

to a halt—the Chinese will continue the expansion of their armed forces and could use them to attempt to conquer Asia.

When one thumbs ahead into the unwritten pages of history and endeavors to footnote prophecies on the blank pages, he should have a sound basis for his attempt at a prognosis. In briefest form, these are some of the indications that Red China is readying herself for further aggression—

(1) The fact that Communist world revolution is anything but dead and that the Chinese are well fitted and well located to alter the face of Asia, leaving Europe and the Middle East to the USSR;

(2) The Army of Red China, growing in size and strength in adopting modern equipment;

(3) The entry of the PLA into Korea, proving the willingness of Peking to use its army in aggressions on foreign soil;

(4) The efforts which Red China is making to infiltrate and to organize fifth columns and related subversive elements in neighboring Asiatic countries;

(5) The sympathy and material assistance given by the PLA to the Viet Minh forces in Indo-China;

(6) The many pronouncements of Mao Tse-tung, which have consistently stressed "foreign encirclement" and "the liberation of the more than a billion oppressed people of the East." The Chinese have picked up the pan-Asiatic torch which the Japanese were forced to drop. The Red leaders of China feel that they are the saviors of Asia. They are gaining strength in this role because no one else has come up with a more moving formula than that of the Communists;

(7) The rapid and successful growth of the PLA which has not only intoxicated the Chinese military hierarchy to a high state of aggressiveness but has affected the rest of the Chinese Communists as well. None of them believes that their armed forces can be defeated in war.

The Future Pattern in Indo-China

The French are in for more trouble! Indo-China will likely be the next significant pressure point of Chinese Communist military aggression, but the Chinese moves will probably be subtle in comparison with the outright entry of their "volunteer" armies into Korea. Red Chinese military efforts to aid the Viet Minh forces will be clandestine in nature because the Chinese do not want their hand called, initially at least.

Up to mid-1951, the PLA had reportedly trained and equipped

some twenty-four thousand troops in South China for the Viet Minh, and in addition it has loaned military advisers and technicians to that insurgent army. French military officials reported in mid-1951 that two more divisions were being equipped by the PLA. Thus the indications are that the Communists of China intend even greater assistance in the future.

The heavy demands of a war in Korea did not permit the PLA to divert very much effort in support of the rebels in Indo-China. However, as the PLA gains more Soviet war materiel, and if the demands in Korea lessen, the PLA will give its poorer Communist brothers its military surpluses of weapons and equipment. The railway from Nanking to the Indo-Chinese border is complete, or nearly so. This link was constructed solely for military purposes, one of which is the supply of arms and equipment to the Viet Minh. The PLA does not have to pour many "volunteers" into Indo-China. It needs only to arm and train the regimented Viet Minh forces at secret bases and direct the officers toward more tactical skill. It will then wait patiently in the expectation that the French forces will exhaust themselves in the festering paddies and jungles. Oriental patience is the great weapon in that struggle—the patience of sloe-eyed guerrillas who were born into the region of heat, jungle and flies, against the impatience of Westerners who were not. The strategical concept is not "hustle and get this over with"; it is "wear the enemy down." Chinese Communist military timetables are designed not for speed but for certainty.

Until August 1951 no regular PLA units were identified as fighting with the Viet Minh rebels but individual Chinese "volunteers" were known. In the future it is probable that Red Chinese soldiers will be scattered through the Viet Minh ranks rather than employed in Chinese units. This pattern will obtain only if the Viet Minh is not effectively defeated. If the rebels are clearly beaten, Red China is likely to repeat her pattern of open intervention as she did in Korea.

Korea Shows up Red Deficiencies

The Chinese Reds have waged war in Korea just the way their tactical concepts up to 1950 had been written. They have repeatedly struck out in "one main direction," in keeping with Mao Tse-tung's teachings. The PLA attacked us initially when we were moving. Later it attacked our weakest military elements. In between its own giant offensives the PLA has generally avoided battle. Lin Piao's military hand and concepts were also

evident in the tactics applied. The use of Red aircraft was the only modern touch up to mid-1951.

Since 1937 at least four million Chinese soldiers have become casualties while serving under General Chu Teh's red colors. Against the Japanese the Chinese Communist military sustained at least two million casualties. In the China Civil War the Reds admit to one and a half million losses. Up until the truce arguments began, the PLA had sustained over five hundred and fifty thousand casualties in Korea. At least four times in its history (1944, 1945, 1947-48 and 1948-49) the PLA has suffered the loss of half a million men in a single year of combat and conflict! One would think that the Red leaders would hesitate in the face of such bloodshed, but they do not. Often they are more concerned over materiel losses than human losses.

PLA armies *can* be put to panic if the right methods are used. The emphasis must be on generating *fear, confusion* and *doubt.* Capital must be made of the inherent Chinese fear of death by lightning or electrocution. To win a war effectively against the PLA, an opponent should develop a trunkful of tricks and ruses designed to play on Chinese soldier minds. Imaginative psychological warfare methods can disintegrate the morale of the PLA's masses. Chinese, or any men, fear the unknown.

Mao Tse-tung and his generals have shown that they are willing to lay down veritable carpets of dead to achieve their aggressive aims. The PLA and the people are docile instruments in the hands of this fanatic hierarchy. The mainland Chinese will obey the Red regime and no hope is visible at this time of any successful revolution against its rule.

Indian Wars

The mounted warriors of the Great Plains gave our Army its hardest Indian fighting. Against them, in the decades after the Civil War, the United States Cavalry set high standards of courage and devotion to duty.

As often as not, small detachments of troopers found themselves pitted against large Indian war parties. That was the case with Major George A. Forsyth's small troop of scouts in the fall of 1868. Forsyth himself had been a brevet brigadier general during the Civil War, the same rank held by W. H. H. McCall who was acting as his first sergeant. Most of their men were veterans, too.

At dawn on 17 September 1868, the troop was surprised in the valley of the Arikaree River in Colorado. Greatly outnumbered, it dug in as best it could with knives and tin cups. By waiting until the Indians were within fifty yards before firing, the troopers took terrible toll with their repeating rifles and broke up charge after charge. Roman Nose, a giant and the principal chief, fell in one assault; but by nightfall seven of the fifty-one cavalrymen were dead and seventeen wounded. Both of Major Forsyth's legs were shattered but he kept command and had men lift him on a blanket to observe the situation.

During the first night two men crept out to try to bring aid from Fort Wallace, one hundred and twenty-five miles away. The remnants of the troop stood siege for more than a week without medical relief, nourished on horse meat. Forsyth granted the able-bodied permission to escape if they could, but all elected to stick it out. When help finally reached them, the half-starved survivors were still holding their own.

The illustration on the back cover depicting the charge of Roman Nose on Forsyth's men is from a drawing by Frederic Remington published by R. H. Russell Company in 1897.